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THE SOUTH AFRICAN REPUBLICS.

THE countries which form the subject of the large map of the present number of the *Geographical Magazine* have recently come prominently before the public in connection with native wars. The Orange River Free State and the Trans-Vaal Republic were founded by emigrant Boers, dissatisfied with the British Government. The latter was inimical at first to the establishment of European States close to their own frontier, but in the end acknowledged a condition of affairs which could not well be helped. These countries have undoubtedly a great future before them, and although many of the old Boers are hostile to the proposed South African Confederation, preferring rather to move further into the interior, there can be no doubt that the realisation of this scheme, by introducing a more stable government and attracting European settlers, would in the end prove of immense benefit. The resources of the two Dutch Republics are great already, and their development is merely a question of time. No country is better suited to the breeding of cattle than the uplands at the western foot of the great dividing range, and the mountain valleys are distinguished by fertility, and rarely suffer from drought. The mineral wealth of the country is immense, especially in the Trans-Vaal. The principal gold fields are indicated upon our map. Coal of superior quality is found in all the mountains between the heads of the Orange River and the Limpopo. This is all the more important, as none of the rivers are navigable throughout, not even the Limpopo, and an ample supply of fuel for railways is thus available.

Copper, lead, zinc, graphite, nickel and cobalt have been discovered, and mines are being worked in a few places. The relations between the Boers and the natives, unfortunately, are not of the most friendly nature. The boundaries of the Republics as laid down upon maps or described in proclamations are illusory, for within them dwell numerous tribes which are perfectly independent of the Boers, and resent every interference with their freedom. Conflicts are thus unavoidable. Where the native tribes have been forced to submit, they are treated harshly. They pay higher taxes than the Boers, are forbidden to acquire land, or even to ride on horseback.

The Orange River State (area, 44,430 square miles) has a population of about 57,000 souls, of whom 20,000 are Bechuanas. The population of Trans-Vaal (area, 114,400 square miles) is 250,000 according to President Burgers, of whom 50,000 are said to be whites. The Rev. A. Merensky estimates the population at 250,000 or 300,000 souls, including 25,000 or 30,000 whites. Amongst the natives there are, according to this competent authority, 60,000 Amaswasi and Matebele Kafirs, 140,000 Basutos, 70,000 Batsoetla and Masele, and 70,000 Bechuanas, besides a few Hottentots on the Lower Vaal and Bushmen on the table-land between the Elephant and Vaal rivers. The area and population of the British Colonies of South Africa and of the two Dutch Republics, are as follows:—

	Area, square miles.	Population.
Cape Colony	195,880	720,984
West Griqualand	16,630	25,500
Basuto Land	8,660	75,000
Kaffraria and East Griqualand	16,030	210,000
Natal	18,750	307,241
Orange River State	44,430	57,000
Trans-Vaal Republic	114,440	275,000
	414,820	1,670,725

The Portuguese occupy a port in Delagoa Bay, but though the whole of the country down to lat. 26° 30′ south has been declared by arbitration to be legally their own, their virtual influence hardly extends beyond the range of their guns. They have come to some agreement about the boundaries with the Dutch Boers, by permitting these latter freely to export their produce through Delagoa Bay. The Boers, however, are naturally anxious to obtain a direct outlet to the sea, and the future must show whether they look upon this compromise as a permanent settlement of the question.

Our map is based to a large extent upon the labours of Mohr, Mauch, and others, which have been published from time to time in Dr. Petermann's *Mittheilungen*, accompanied by maps of superior excellence. We have likewise embodied in it the result of more recent explorations, particularly those of the lamented St. Vincent Erskine, who explored the Limpopo and the country to the north of Delagoa Bay, more fully than had been done by his predecessor Mr. Elton. A large portion of the Trans-Vaal Republic is based upon a map by the Rev. A. Merensky, the superintendent of the Berlin Missions in South Africa.* Mr. Merensky places Lydenburg, a cardinal point, in long. 31° 31′ E., on the authority of Mauch and St. Vincent Erskine. Neither of these travellers, however, has made an observation for longitudes there; and the latter, in a valuable paper published in vol. xlv. of the *Journal of the Royal Geographical Society*, rectifies his previous statement, and places Lydenburg

* *Zeitschrift für Erdkunde*, vol. x. 1875.

in lat. 25° 5′ S., long. 30° 37′ E. This position we have accepted. We have laid down upon the map the routes recently travelled over between Natal and Delagoa Bay, by Mr. Percy Hope,* as well as a route from Lydenburg to Lorenzo Marquez, by Dr. E. Cohen.† Natal has been delineated from Mr. A. Mair's large map, published in 1875. Amongst minor authorities, we mention a map of South Africa, by Charles Solomon, published at Cape Town in 1875.

THE ABBÉ ARMAND DAVID'S TRAVELS IN CHINA.‡

IN a previous number of this Magazine (vol. iii., part vi.) a sketch was given of Abbé Armand David's travels throught he western provinces of China, Hupe, Szechuen and Queichow, down to the time of his leaving that country in July 1870. The enfeebled state of his health, and the distracted condition in which he found France on his return, obliged Père David to remain longer in Europe than he intended, and it was not till March 1872 that he returned to China to resume his study of the natural history of this little-known empire. Père David has now published an account of his travels (from Peking to Shensi and Hupe, and into Kiangsi) between this date and when he was compelled, by continued sickness, to leave China for good.

After a short trip to Ningpo, in the Chêhkiang province, Père David took steamer from Shanghai to Tientsin, and thence proceeded overland to Peking. There he devoted four months to arranging the collection of specimens of natural history which he had organised at the Pei T'ang (Northern Hall), the Roman Catholic establishment situated just outside the Forbidden City or Palace grounds; and it was not till the 2nd of October that, an agreement having been made with two carters to carry the Abbé, his two attendants—who acted in the double capacity of servants and *chasseurs*—and 400 lbs. of baggage to this town, or a distance of about 900 miles, for the sum of about 52 taels silver (about 15*l.*), and an additional six shillings for each day's delay caused by Père David for his own purposes, a start was made for Si-an-fu, the provincial capital of Shensi.

On the 4th of October, having travelled about 80 miles, the party reached the small town of Peiho, where they found an *ambassade* of Tibetan lamas, returning home at the expense of the Government from Peking, whither they had been sent by the Dalai Lama to offer his homage to the Son of Heaven. Père David, out of curiosity, paid a visit to the head of this mission, who was a *Hwo-fo* or incarnate Budha. He found him seated behind a table covered with red silk, and arranged like an altar, with sticks of incense burning before him. At his side was a bottle of warm spirit, of which, from time to time, he swallowed in a majestic manner a small glass or two. The holy man did not show the slightest sign of consciousness of the intruder's presence, but his suite expressed their dissatisfaction at the stranger's daring indiscretion in entering the presence of their living idol without prostrating himself.

As the route tends southward, the Si-shan or western hills, a range extending from Peking to the northward bend of the Yellow River, gradually lose their elevation, and the country broadens out more and more into sandy plains, upon which cotton, sorghum, ground-nuts and sweet potatoes are cultivated in abundance. After six days' travel, Ching-ting-fu, a very large town surrounded with fine massive walls resembling those of Peking, but said to contain only some 10,000 inhabitants, was reached. It is the residence of a Roman Catholic bishop, and boasts of a magnificent Gothic church of recent construction. No halt, however, was made here, and on the 14th of October the party passed across the border from Chili into Honan province. On the broad plains here, large numbers of wheelbarrows fully laden were met scudding under sail before the south wind. Rain overtook the party, and compelled them to suspend their journey for a while. The roads were rendered almost impassable, and travelling for some days became most laborious, the carts sinking to the axle-trees in thick black mud, to cleanse the wheels of which and to rest the exhausted mules frequent halts had to be made.

On the 24th of October the Yellow River was reached. Père David found it about 3 miles broad; but it was evident from the large tracts of mud, dry at this season, extending on both banks—if banks, they can be called, so slightly are they above the bed of the river—that in summer it must attain a much greater breadth. The bank was reached at 6 A.M., but Père David had to wait four hours before the ferrymen, having by that time finished their morning meal, were ready to man the boat; by this time a crowd, chiefly small tradesmen, anxious to cross, had assembled. Owing in some places to the rapidity of the current, and in others to shoals, the crossing was naturally a matter of some difficulty; but when nearly across, the ferrymen purposely ran the boat aground on a long low-lying mud-spit, and commenced levying an extra *pourboire* as the price of taking her to the usual landing-stage. Père David, however, while stating it to have been his intention to have given a handsome gratuity on landing, resolutely refused to make any promises before reaching the proper stage. The ferrymen thereupon expressed their determination, under the circumstances, to remain where they were for the night. The other passengers made their way ashore as best they could, but as the yielding nature of the spit would not allow of the carts being landed there, Père David, after vainly endeavouring to induce the boatmen to continue the passage, sent one of his attendants with his passport ashore, in a boat which happened to be passing, to the nearest magistrate. The boatmen commenced preparations for their evening meal, but Père David losing patience at this *nonchalance*, drew a revolver and threatened to put a bullet through the first pot which should be set on the fire; and they, not appearing to relish the idea of a meal of uncooked rice, concluded that the best policy would be to yield to the impetuous foreigner, weighed anchor and brought the boat to the landing-place. They had, however, carried matters too far. Père David's messenger had in the meanwhile landed and made for the nearest magistracy. Magistrates in China

* *Journal of the Royal Geographical Society*, vol. xl.v.
† *Second Annual Report, Hamburg Geographical Society.*
‡ *Journal de mon troisième voyage d'explorations dans l'Empire Chinois*, par M. l'Abbé Armand David, de la Congrégation de la Mission, &c., &c. 2 vols. Hachette et Cie. Paris, 1875.

are usually credited with a strong antipathy to all foreigners, and to propagandists in particular, but this belief is probably in most cases the outcome of exaggeration. In the present case, at least, the magistrate could scarcely have done more than he did: no sooner was the passport shown and the charge laid, than runners were dispatched to arrest the boatmen, and these latter only obtained their release on payment as fine of a larger sum than was represented by the gratuity which, in spite of their ill-behaviour, Père David presented them with on leaving.

From this point the route, instead of, as hitherto, following a southerly direction, turns off almost directly west across the *loess* country. In Mongolia Père David found amongst loess fossil remains of *Elephas primogenius*, *Rhinoceros tichorhinus* and of many unknown kinds of *cervus;* and he, therefore, agrees with Baron von Richthofen in thinking that, when sufficiently explored, it will yield evidences also of the contemporaneous existence of man. Like Mr. Kingsmill, however, he rejects Richthofen's theory of the formation of this enormous deposit as the result of vegetable decay through countless centuries, aided by deposits, wind-borne from the neighbouring hills, of soil and disintegrated rock. He believes this "to be one of the causes, because it would explain to a certain extent many phenomena, such as the existence in it of unbroken land mollusks, the dispersion of fossils of land mammals, and above all the absence of strata. But this theory does not appear sufficient, in his opinion, to account for facts of the greatest importance with regard to the formation of this diluvium, its presence in certain tracts, and its absence in others, its uniformity of composition everywhere, and its independence of that of the rocks underlying it, &c." His own opinion of the cause is that during an aqueous period a sudden upheaval of the mountains of Shensi and Eastern Honan was caused by a combustion of the coal deposits due to the decomposition of sulphide of iron. This upheaval intercepted the course of the Yellow River, and caused its waters to fill up the basin thus formed. This action was, he believes, likewise aided by heavy rainfalls which washed down from the surrounding mountains shells, remains of mammals and immense quantities of soil, thus giving the loess the colour, as it always has, of the soil of the neighbouring mountains. In view, however, of the fact that this loess is the distinguishing characteristic of almost the whole of North China, and, according to Richthofen, "determines the physical features of a region at least 250,000 square miles in extent," the theory of its formation here propounded can scarcely be accepted as a satisfactory or adequate one.

When undermined by water the loess has a tendency to break into rifts or gullies, the sides of which are usually hollowed out into caverns, which serve as habitations for the poorer class of people. The roads also follow these rifts, which are in places so narrow that two carts cannot pass, and when two do meet it is sometimes necessary for one to go backwards a couple of miles to allow the other to pass: these rift-walls are in places of extraordinary height, in some places 200 feet, or even more, and almost always perpendicular.

The further the party proceeded westward, the greater was the number of ruins they met. Père David complains bitterly of the delay which was occasioned by repeated examination of his passport at the various guard-houses in Tungkwan, the entrance to the narrows at the bend of the Yellow River. But when we consider the great strategical importance of this town, as the key to the entrance into the provinces of Kansu and Shensi, it is scarcely surprising that in view of the unsettled state of the country at this time, it had been found necessary to exercise the greatest watchfulness over all who passed in and out.

From this point the route left the Yellow River to follow the course of the Wei River. All towns and villages here are described as being surrounded with moats and massive walls, but these had proved but an insufficient protection against the attacks of the Taiping and Panthay rebels. The houses, especially as regards the roof, are remarkable for their ornamental and elegant style; but almost every building, and, without exception, every pagoda or temple—a statement corroborated by Von Richthofen—had been destroyed; the people, or such as were left (for Père David computes that the population does not number over one-fifth of what it was previous to the incursions of the rebels), appeared sullen and distrustful, were clothed in rags, and, compared with the inhabitants of Honan, decidedly ugly. Iron abounds, and outside the ruined pagodas were seen large lions cast in iron, and enormous chandeliers of the same material, sometimes 40 to 50 feet high.

On the 3rd of November Si-an-fu, the provincial capital, was reached, and after an hour's detention for the examination of passports, the party proceeded to the Roman Catholic mission there. From the bishop, Père David learnt that, owing to the Panthay rebellion, to follow out his plan of proceeding into Kansu would be impossible, and that he must content himself with exploring the Tsing-ling, a range of mountains extending from the uttermost boundary of Shensi, along the southern bank of the Yellow River, into Honan, and some of whose peaks attain an altitude of 11,000 to 12,000 feet. Whilst preparing for a new start, he fell in with a native priest who had travelled over a considerable portion of Central Asia, and from him obtained sufficiently detailed information to satisfy himself of the existence—apparently since established as a fact by Sir D. Forsyth, *vide Report on Mission to Yarkand in* 1873, p. 53—of camels with two humps in a wild state on the plains between Kansu and Kashghar.

On the 11th of November a start was made in a large three-mule wagon. The increasing ruggedness of the route did not, however, admit of this mode of conveyance being utilised further than Shihkingts'üan (Fountain of the Stone Well), a small Christian hamlet reached on the evening of the same day; and on the following morning the Abbé pursued his way to another Christian hamlet, situated further up the hills, and named Inkiapo, according to the French method of romanising Chinese sounds, where he remained some days. The hills consist here chiefly of greenish gneiss and flinty micaceous schist, and are generally denuded of trees; where, however, these are allowed to grow, the chestnut, oak, walnut, and other denizens of the north are found clumped with trees of purely southern growth, such as the *Rhus vernicifera*, *Cornus*, *Rubus*, *Cephalotaxus*, &c. The skin and skeleton of a leopard of more than average

size were purchased from a neighbouring hamlet; and one of these animals having carried off a dog during the night from an adjoining house, Père David, at the earnest request of the villagers, sallied forth in search of it. It is traced down to a neighbouring copse, but the beaters do not relish making a closer acquaintance and retire; Père David, however, notices something moving, and aiming at it, brings it down. After waiting a considerable time to be sure that life is extinct, he enters the clump to examine his game, when he finds that he has mistaken for a leopard's eye the bright neck of an innocent partridge (*bartavelle*)! Antelope and wild boar appear to be very common on this range; musk-deer and porcupines were also met with, and at some distance monkeys were also said to abound.

On the 10th of December, Père David pushed in a south-westerly direction further into the heart of the range. In the valleys, at its base, potatoes and maize were cultivated in small quantities: the mountains themselves were but sparsely inhabited by wood-cutters, whose huts were scattered over the slopes, and who devoted themselves exclusively to the felling of timber—a work which is progressing with such rapidity as to promise the entire denudation of the mountains, within a few years, of those forests of pine which, until the immigration a few years since of these wood-cutters from the neighbouring province of Szechuen, were "primeval and uninhabited." Owing to the inclemency of the weather, which had covered the mountains with snow and ice, few or no specimens could be obtained, and the party had to return to Inkiapo.

Here, after many futile endeavours, Père David succeeded in obtaining some specimens of a bird, which, like an *ignis fatuus*, seemed always to elude his grasp just as he was most certain of catching it. The Chaoho-lo, which Père David says is named "*éteignez le feu*" from the fact that its notes are mostly heard after the evening meal, when the fire is no longer required, but much more probably because this is a close reproduction of its note, is about the size of a thrush, of an olive tint on the back and white beneath, with black patches on the breast, and a deep brown over the ears, forehead and legs. Père David recognised it as a new species of *Pomatorhinus*, and named it *P. Gravivon*.

While staying at Inkiapo, Père David occupied the apartments set apart for the priest—a native, named Chang—on his annual visitation to this district. Soon after the Abbé's return from his excursion to the Tsing-ling, the priest sent notice of his approach, and the former had to seek other quarters. It is amusing to notice the bitterness which characterises the description of the visitor's progress, and the diatribes indulged in against Chinese obsequiousness to those in authority. Seated in a chair, borne by four Christians clothed in red, and preceded and followed by a numerous *cortége*, his approach heralded by the discharge of fire-crackers and petards, Père Chang advances up the slope of the hill perfectly unmoved by all these attentions, and so impressed with his own worth or so unconscious of his surroundings as, to Père David's deep concern, never to think, as the former expected he would have done, if only for considerations of humanity, of dismounting and walking when the road became steep and trying. Père David avails himself of this opportunity to inveigh against the *manières mandariales* of the native priest and the *excessive obsequiosité* of the Christians. Putting aside the question of the appropriateness or otherwise of such a bearing on the part of the preachers of a religion founded in meekness and humility, it is interesting to note the impression it creates in the mind even of an ecclesiastic when he views the matter from the standpoint of an outsider. Had he pursued this train of thought somewhat further, he might have comprehended that it is this very arrogance and assumption of *manières mandariales* on the part of all members of the Roman Catholic religion, from the lowest acolyte up to the bishops—whose progresses, as chronicled with the greatest pride and self-satisfaction in the *Annales de Foi*, are made to compete with and, if possible, surpass in *éclat* and magnificence the visitations of a viceroy—that render the Chinese government inclined to view their communion not as a religious, but as an aggressive political organisation, that give rise to most of the hatred and hostility entertained towards it, and afford the most serious obstacles to the spread of their religion. Into the present instance, however, a more personal element perhaps entered, and pride of race may have been the source of the bitterness undoubtedly experienced. This, at least, seems to be the key-note to the following sentence: "At the side of a Chinese who does not even take the trouble to fill his own pipe himself, it is but a sad figure that is cut by a foreigner, who wearies himself out every day, wearing no clothes but the commonest, and performing without cessation work of the meanest character."

The houses in this, the S.W., portion of the province compare very unfavourably with those in the northern and more prosperous portion. Père David, however, noticed that the inhabitants here as well as of the west of China generally differ much from the *li-min* or black-haired race of the east. They have fair complexions with bright colour, ruddy beard and hair, and eyes of chestnut hue. They seem, too, to differ from the majority of Chinese elsewhere, in a fondness for a great variety of colour and display in clothing. "The colour of the clothes worn by children and the young generally is a bright scarlet; red trousers, red robe, and sometimes red stockings. In the case of which I speak (the 16th of the first moon, when the young married ladies are said to return for a few days to the paternal roof) the toilette of the Chinese lady, generally so simple and so modest, is truly dazzling in this part of the country. The head is adorned with a sort of diadem surmounted with garlands of gold and silver; the wide trousers and long robe of silk are trimmed with embroideries of blue, green and black, which serve to tone down somewhat the brilliance of the scarlet ground; the little shoes, resembling in shape a goat's hoof, glitter too with a richness of satin and abundance of ornament unknown elsewhere."

This province, especially the loess ground of the north, seems to enjoy an extraordinary fertility: flour, in spite of the large quantity of grain required for the support of the army in Kansu and Yünnan selling at 13 or 14 cash (say three-fifths of a penny) per pound, or at a fifth of the price at Peking. In the same district coal was selling at the pit's mouth at 100 cash per 1000 catties, or about 9*d.* per ton. In the S.W. portion Père David saw abundance of anthracite, very hard in quality, and so difficult to light that the furnaces

once lit were not allowed again to go out; it gave out no smell, and was smokeless. At the pit's mouth it was remarkably cheap, and even where Père David saw it (he does not state the distance from the mines), it only cost a cash a catty, say 7*s.* 6*d.* per ton. When broken it assumed not a prismatic or cubic, but conchoidal form. Though unable to find any traces of leaves in the coal, Père David is of opinion, looking at the rocks amongst which it is found, that the coal is of great antiquity; owing, however, to considerable local confusion it is difficult to trace any succession of the strata, and in view of the great abundance of sulphur in the vicinity, he is inclined to account for this confusion by (apparently a favourite source with Père David of geological displacements) spontaneous combustion of the coal at some period caused by the oxidation of sulphide of iron with which the rocks abound

In his travels, extending over three months in southern Shensi, Père David scarcely found 150 different species, and of these but four could be considered as new, viz.:—*Ithaginis sinensis*, *Pomatorhinus gravivon*, *Pnœpyga halsueti*, and *Uragus lepidus*. He started, however, in winter, and though he professes to consider this the best time as likely to show the species indigenous to each locality, it must be allowed that it is not a favourable one for the acquisition of a large number of specimens.

From Inkiapo, he passed along the Wei-ho to Szeyüan-shang, with the purpose of proceeding into Yünnan, but failing to obtain any luggage-bearers to accompany him, he was forced to return to Yenkia-to'un, and thence proceed in a S.W. direction to a Christian hamlet, Wangkia-wan, near Han-chung-fu, where he determined to remain. The road—presumably the old road constructed some 1600 years ago—lay directly across the Tsing-ling, which at this season of the year especially presented a dreary, monotonous aspect. On the 26th of February, Père David emerged into the open, well-cultivated plain in which the town is situated; and here and in the neighbourhood he remained until the 15th of April. The Abbé did not succeed in adding much to his collection, and nothing occurred during his stay there of interest, except, perhaps, an exemplification of the method employed locally to capture a swarm of bees. A man began by shaking at the end of a bamboo an old conical hat very gently until it was quite close to the bees. Inside the hat was hung a piece of cloth, in the shape of a bell-clapper, which, as well as the inside of the hat, had been saturated with salt water. This speedily attracted the swarm, which attached themselves firmly to the soaked surface. Those bees which were slow to enter were hastened by a gentle brushing with a bundle of artemisia (*? pyrethrum*) twigs fixed at the end of a pole. When all the bees had attached themselves, they were carried, without fear of stinging, to a hive which had been already prepared near at hand. The hives were generally made of hollowed trunks of trees. When it was desired to take away the honey and wax, the bees were stupefied with the fumes of burnt joss-stick (sticks of incense); or more frequently they were compelled to leave the hive for a time by fumes of the same substance, and, during their absence, as much of the comb was cut out as required.

On the 17th of April, Père David embarked with his two *chasseurs* at Chênkow-chên, a small town on the Han River, a little below Han-chung-fu, on board a boat so well laden with tobacco, rice and slate from the Liang-shan, that there was scarcely room to sit. As is usually the case the boatmen were opium-smokers, but the indulgence in this habit—indeed, in spite of much that is said to the contrary, it enables the endurance of a much greater amount of work of exposure amongst this class than could otherwise be borne—did not dull the master's mercantile instinct. He lost no time in investing the half passage-money, which had to be paid in advance, in an additional quantity of rice, which, however, as it eventually proved, gave the boat a dangerous draught of water. The distance from Han-chung-fu to Hing-an-chow is stated to be 1240 *li*, say 410 miles; the same distance thence to Laoho-k'ow, 60 miles above Siangyang-fu, and 1360 *li*, or 450 miles from the latter place to Hankow, in all 1270 miles. The journey occupied twenty days, and as Père David travelled in a native boat and appears to have had to submit to the usual delays at barriers and customs' stations, this may probably be accepted as the time which would be ordinarily required by Chinese boats to perform the journey. The river would appear, however, to be but ill-adapted for use by any but vessels of the lightest draught; for above Kiun-chow it is described as but one succession of dangerous rapids (one rapid alone was two-thirds of a mile in length, at another place they continued uninterruptedly for nearly three miles), for the navigation of which local pilots are taken by boats passing; and below that town navigation is interrupted and impeded by shoals and sand-banks. How fraught with danger is the navigation of the upper portion of the river is shown by Père David's experiences. Two days after starting the boat struck a rock in passing a rapid, where another junk was already lying wrecked, but fortunately without any damage being caused; three days later, after successfully weathering two very violent rapids, the boat was dashed to pieces in a third. On the same day three other junks were either disabled or entirely lost on or close to the same rock on which Père David's was wrecked; and before the last rapid on the downward voyage was passed, at least one other large junk was seen *hors de combat*. But little of the cargo was saved, the rice portion sinking immediately. Père David, however, by immediate strenuous efforts, while the master and crew were abandoning themselves to vain lamentations, succeeded in rescuing the larger portion of his baggage and collection of specimens, though of course more or less damaged by the immersion. Having charitably dispensed a gratuity to the owner and captain of the lost junk, Père David engaged passage in a boat laden with wood to Laoho-k'ow, which is described as a shipping port of no mean importance, where was seen anchored a multitude of junks of all sizes and forms, an evidence—each shipping centre having a special style of build easily recognisable—that the business carried on there must extend its branches to all parts of the country. Here a more commodious boat was hired for the last stage of the journey, and Hankow was reached without further adventure on the 7th of May.

During the few days he remained at Hankow, Père David had the pleasure of again meeting M. Garnier, the leader, on the death of M. de Lagrée, of the expedition sent from Saigon up the Meikong River,

through Yünnan to the Yang-tze. Having determined to study the fauna and flora of Kiangsi and especially of that portion of the province which borders Fukien, Père David took passage in a river steamer, built on the model of the American ferry-boats, to Kiukiang, which town he reached on the 11th of May. Here he remained a few days at the Roman Catholic Mission, the members of which were French, and then, the waters of the Poyang lake and canals being very low, he started overland for the S.E. portion of the province. But the journey was far from an agreeable one. Unpleasant as in some respects the passage down the Han in a cramped boat had appeared, it contrasted favourably with the present one; the inns were dirtier and less commodious than elsewhere; the chair-bearers fell sick and had to be left behind, and one of those hired to replace them took the earliest opportunity to disappear with the wages which had been advanced to him. Frequent downpours of rain were encountered, and consequently bad roads. However, on the 31st of May the party reached Fuchow-fu, where the Mission has an establishment under the charge of M. Anot, to whose devotion and energy Père David pays a high tribute of praise.

From what Père David says, it would seem that though the Christians suffered no less than the majority of the inhabitants of Kiangsi from the ruthless destruction of the Taiping rebels, their numbers, at least in this province, are annually increasing. Perhaps this is to no small extent due to the influence which is being exerted through the *Sainte Enfance*, an institution established for the reception of children cast away by their parents. Infanticide, especially of daughters, is stated to be very common in this portion of the province, and as many as 1300 of these little castaways have been at one time in the nurses' hands. When old enough they are put out amongst Christian families, and of course educated in the tenets of this religion. They appear to be much sought after as wives, partly because they are better educated than other girls, and partly because the husband has only to give to the *Sainte Enfance* half the sum he would have to spend in ordinary cases of betrothal. Père David seldom has a good word to say of the Chinese character; chicanery, falsehood, ingratitude, are terms of constant application to them throughout his notes, and conversion to Christianity does not appear to work much reform. As a rule he seems to look at the religious question in a very fair spirit, and his opinion, therefore, of the chances of Christianity in China may not be uninteresting.

"The Christians," he says, "throughout the Empire were much more numerous formerly than they are now. To speak of Kiangsi alone, I am told that there is not a town which had not at one time its Christian chapel or chapels. But taking the whole of China the Christians can scarcely number one to a thousand heathen. And although in the Eighteen Provinces the conversions are continually growing more frequent, the general conversion of this people, if it ever takes place, can only, in my opinion, be looked forward to in a future still very distant, especially as the continually increasing facilities for travelling and establishing missions in the interior of the country, are attracting more and more preachers of every conflicting sect. This deplorable divergence in the teaching and practice of Christianity is for the Chinese a *seminarium* of indifference, because they are thus led to believe that each western nation has a religion of its own; and they think they are no less justified in maintaining their own. This is a conclusion which occurs naturally to the mind of a man who will not and cannot study the *religious* question."

After a few days' rest, Père David started for Ts'i-tu, a small village not far from the prefectural city of Kienchang, where he proposed to make his head-quarters for the summer, which was to be spent in excursions into the range of mountains forming the boundary between Kiangsi and Fukien. Intense heat and illness prevented the execution of this design. The surrounding country is devoted almost exclusively to the cultivation of rice, and the marshy nature of these fields gives rise to a severe and dangerous kind of fever. Père David's Peking *chasseurs* had no sooner arrived than they were attacked, and were scarcely convalescent before the Père himself fell very ill with it. The characteristics appear to be extreme nausea and entire loss of appetite, intense burning in the head, and racking pains accompanied by more or less delirium. Unprovided with medicines, he could only let the fever run its course: he witnessed, however, a mode of treatment recommended by a Chinese student of medicine, which appears to have been not ineffective. This is it: boil a hen's egg quite hard, take off the shell and then roll it gently, so as not to break it, over the invalid's stomach, replacing it in warm water from time to time to prevent its getting cold. The egg is supposed to absorb the *fluides morbides*, which cause the sickness, and Père David mentions as a strange fact that the yolks of eggs used for this purpose were, after the operation, thickly covered with wort-like excrescences, which they have not when rolled in a similar manner upon a piece of wood or stone.

As soon as he became somewhat convalescent, Père David started to explore the mountains forming the boundary between Kiangsi and Fukien. But during his stay amongst them (from the 9th of October to the 1st of December) he was almost uninterruptedly sick, first from a relapse of his fever and subsequently a complication of fever and pleurisy, which brought him to death's door. Even when recovering from these severe illnesses he was too weak to be able to make excursions amongst the hills, and was forced to depend for specimens upon the mountaineers whom he took into his service. The mountains here in their highest portions are computed to attain an elevation of 10,000 feet; several species of pheasant, including the taagopan, the Elliot, the silver, and those with a collar and without, abound. Troops of monkeys also roam over the hills, changing their location according to season and the food obtainable. There appear to be at least two species, one of a brown colour, the other yellow, with a grayish tint when young and bright red at mature age; the troops are always under the direction of one full-grown male, who keeps watch and directs all movements: the remainder of the troop are females and young, the latter (when males) apparently separating as soon as full grown, to form troops of their own.

Thoroughly worn out with sickness, Père David was forced to abandon his proposed explorations, and return without loss of time to Kiukiang: and failing to recover his strength there he proceeded on to

Shanghai, and took passage in the M.M. steamer to Marseilles.

The list of all the specimens obtained is not yet completed, but of the value of Père David's contributions to scientific knowledge, in spite of his ill-health, some idea is given by the following enumeration of the number of new species discovered: 764 species of birds, or 232 more than all those of Europe, were captured, of which 146 only, chiefly water-fowl and birds of prey, are found in Europe, and some 60 more, chiefly aquatic, in North America; 9 species of squirrels, of which two are known in Europe; 30 of *mus*, of which the only European species is the *Mus decumanus*; 12 kinds of tortoises, none European; 19 lizards; 35 snakes; 4 salamanders; and 13 batrachians, all new. The coleoptera belong, in great part, to European genera, but are of different species, whilst amongst the beetles, no European kinds were found.

Beyond, however, the domains of his own specialty, Père David's speculations and even assertions can only be accepted with the greatest caution. They are characterised at times by extraordinary rashness and apparently almost entire lack of that critical spirit—one of the first requisites to scientific study—which prompts men, before putting forth any statement, to assure themselves of its strict accuracy by every means in their power. Among many instances, the following may be cited: He states (vol. i., p. 22), the foreign population of Shanghai at something less than 10,000, or at nearly four times its actual number; (vol. ii., p. 56) that large quantities of *mu'sh*, or fungus, are shipped from below Hanyang-pin to Hankow, on account of *Europeans*. On pp. 227, *et seq.* (vol. i.), he ventures an elaborate explanation of the reason why, when the graves of the dead are reserved sacred from tillage, the whole country, in view of its enormous population, and the antiquity of the custom, has not become one vast consecrated graveyard. This, he gravely states to be that, when a revolution occurs and a new dynasty succeeds in establishing itself on the throne, one of its first acts is to order not only the destruction of the imperial mausolea of the preceding dynasty, but the destruction and ploughing up of the tombs of all subjects who are unfortunate enough to have been buried previous to its own establishment. The only exception, Père David remarks, is the present Manchu dynasty, which, to secure the support of several powerful families, guaranteed their family tombs from destruction. What Père David's authority for such a statement is, it would be interesting to learn. It has usually (there are exceptions prior to the present dynasty, even to this rule) been the custom for an individual who has succeeded in establishing his family upon the throne of China to raze the mausolea of the previous dynasty, but never, as far as we know, has he gone the length of destroying the graves throughout the empire. The restoration to agriculture of the sites of graves is effected not by the issue of an arbitrary edict, but by the gradual extinction of families or their removal to another portion of the empire. The present dynasty, it is true, so far departed from previous custom as not only to forbid the desecration of the imperial mausolea of its predecessors, the Mings, but even to sanction an appropriation of public funds for their maintenance; but they entered into no compacts with private families in this respect, and granted them no privileges. Indeed, so far from it, they abolished the style of dress and *coiffure* followed under the Mings, and rendered obligatory that now current, which is regarded, even to the present day, more or less in the light of a badge of servitude to a foreign race.

Judging from the statement (vol. ii., p. 207) made with reference to the settlement of the audience question—that to the French Minister, M. Geofroy, the credit of the settlement was solely due, all the other legations having declined to take any steps in the matter—the political disquisitions in these volumes must be accepted with no less caution.

Père David touches upon the much-vexed question of the population of China, and from statistics gained during his residence in Kiangsi is inclined to think that the population exceeds 300,000,000. He maintains that though the population of some of the provinces may have been diminished thereby to a half or even a fifth of its previous number, it has in no case been decimated as has been believed. He admits that many of the cities contain fewer inhabitants than might have been expected, but maintains that the population of the mountainous districts, where few or no inhabitants would have been looked for, counterbalances this. His calculation is based upon what he believes the population of Kiangsi. This province contains 13 *fu*, divided into 75 *hien*, 2 *chow* and 2 *ting*. The *hien** of Nanchên, which he holds to be a fair average, is divided into 55 *tu* or cantons, in the least populous of which Père David was staying. This contained 19 hamlets, and was believed to have about 1000 families: calculating 4 to a family, the population of the canton would be 4000 individuals, and of the district (*hien*) 220,000 and that of the province 17,380,000. Though many of the provinces are more sparsely populated than Kiangsi, many also have a much denser population; and Père David therefore thinks that this province may be fairly taken as an average, and hence computes the population of China at upwards of 300,000,000.

The latest official census, that of 1812, gives the population as 362 millions odd, and makes the average population in Kiangsu 850 to the square mile, 705 in Anhwei and 671 in Chêhkiang, and the average population throughout China as 266 to the square mile. In view of the fact that Belgium, the densest inhabited country in Europe, has but a population of 451 to the square mile, and British India of but 201, it is scarcely credible that these provinces could have been so densely populated as the above figures would indicate. But whatever was their condition in 1812, their population at the present time nowhere approaches it. The ruthless destruction and slaughter of the prolonged rebellions of the Taipings, Nienfei and Panthays, laid waste millions of acres of cultivated ground, and brought death to millions of their peaceful inhabitants. In the census above alluded to, the population of Chêhkiang is given at 26,256,784; but Baron von Richthofen, the most scientific traveller in China for years, from detailed calculations made when travelling through that province in 1871, estimated that the population could not at the outside exceed 8,100,000, not one-third of the earlier

* Department is the word used, which in the same page is used as the equivalent of *hien* and *fu*.

computation. Although Chêhkiang suffered severely from the devastations of the Taipings, the riverine provinces of Kiangsu, Anhwei and Kiangsi suffered at least equally severely: the northern provinces suffered also very severely from the Nienfei and the southern and western from the Panthays. Many of the provinces are now recovering with rapid strides, but after careful calculation, 200 would, in our opinion, be a liberal allowance per square mile, and we are inclined to join issue here also with Père David, and to state the population of China as little, if at all, over two hundred and fifty millions.

ALFRED E. HIPPISLEY.

THE NORTHERN SIBERIAN EXPEDITIONS.

AN interesting account of Professor Nordenskiold's recent commercial and scientific expedition from Norway to Siberia is to be found from the pen of Dr. Stuxberg, who accompanied the expedition, in the last number of Dr. Petermann's *Mittheilungen*. The following is a brief summary of the article:

Professor Nordenskiold left Tromso in the steamer 'Ymer' (Captain Ericson) on the 25th of July, and made direct for the Matochkin Shar, the straits separating the two islands of Novaya Zemlya, the coast of which was sighted on the fourth day after leaving Norway. At the western entrance of the Matochkin Shar they met with two Russian schooners engaged in salmon and other fishing. On the 31st of July they emerged into the Sea of Kara, and soon fell in with drift ice, which, however, soon proved to be impenetrable, and necessitated a retreat to the Matochkin Shar, and until August the 5th they lay anchored close to a ruined hut in which a portion of Rosmysslof's expedition in 1768-9 had wintered. The 'Ymer' then entered the Sea of Kara again, and sailed along the east coast of Novaya Zemlya as far as Burrough's Straits, and then pursued an easterly course towards the Yalmal peninsula, which, after frequent tacking, was sighted on the 10th. Seeing open water ahead they endeavoured to steam northward, but were soon encompassed by the pack. It was, however, apparent that the further they got from the neck of the Gulf of Kara the more scattered was the ice. The estuary of the Yenisei was reached on the 15th of August, and they then passed under the west coast of a hitherto unknown island called by them Siberiakoff Island. It appeared to be about 50 versts in length, and to be inhabited by a large number of reindeer. The depth of the river ranged between 5 and 15 fathoms, but shallows were not unfrequently found in the neighbourhood of the islands. A native named Feodor who had taken the boat up-stream the previous year, was taken on board, but he proved to be unable to pilot the vessel up; and at Korepofskoye the goods were unladen, and the interval, while awaiting the arrival of Dr. Theel and his companions, employed in geological and zoological researches.

The expected travellers did not, however, turn up, and on the 1st of September Professor Nordenskiold's party commenced their return journey. The strong current carried them further north than they had anticipated, and they followed much the same course as the 'Proven' took the previous summer. They passed the 75th parallel and then encountered a portion of the pack, along the eastern margin of which they coasted, entering the Matochkin Shar on the 7th, and reaching Hammerfest on the 18th of September.

The whole journey is described by Dr. Stuxberg as extremely pleasant; no storms were experienced, though a cloudy sky was the rule. The ice proved very obstructive in the Sea of Kara, but notwithstanding this the Doctor considers that the journey affords a further proof of the possibility of free navigation between Novaya Zemlya and the Yenisei.

Professor Nordenskiold intends to collect the journals of the Norwegian whalers since 1869, and to compare their observations with those taken by his expedition. These last were both frequent and varied. Although small hopes were entertained of making biological investigations, yet rich forms of animal life were obtained in the Kara Sea, and subfossil remains from the *tundra* of the Yenisei. The most noteworthy among the latter are a piece of mammoth skin about 1½ inch thick, some mammoth bones, and a musk-ox skull. The two animals would appear to have been contemporaneous at one time, though the former is now extinct. A large number of shells were also obtained from the neighbourhood of Korepofskoye.

The deposits of the Siberian *tundra* are of marine origin, and testify to the former presence of an Arctic Sea, similar in its fauna to the Sea of Kara. Two re-remarkable specimens were discovered, one a new species of sea-cucumber, and the other an *Umbellularia* about 1¼ foot in length obtained from a depth of 130 fathoms. This last is a great rarity. Two specimens were obtained on the coast of Greenland and named *Isis eucrinus* by Linnæus in the middle of the last century. This form of animal life was the subject of discussion and controversy till the Swedish expedition to Greenland in 1871 came across two specimens in Baffin's Bay; and others were subsequently found by the Challenger expedition between Portugal and Madeira, and near Kerguelen Land. The Austro-Hungarian expedition obtained some in 1873, between Novaya Zemlya and Francis Joseph Land, and during last summer others were found between Norway and Iceland. It is, in fact, a form of life of wide distribution but of extreme rarity.

The expedition* of Messrs. Finsch, Brehm and Zeil to the mouth of the Ob and the Sea of Kara naturally claims attention in treating of Professor Nordenskiold's journey in the same part of the globe. The Bremen travellers reached Obdorsk on the 13th of July, but, as a vessel suitable for navigating the Gulf of Ob was not obtainable there, they had determined to travel towards the Bay of Kara, to determine the possibility of uniting the basins of the Sea of Kara and of the Ob by a canal communication between the Poderata River, which flows into the Northern Sea, and the Chuchya, a tributary of the Ob.

Obdorsk was left on the 16th of July, and the same evening the travellers entered the smooth water of the Little Ob, a dependent channel of the great river. Navigation here became a matter of great difficulty, as the left bank was quite overflowed, and the whole surroundings a maze of canals and waterways, with occasional settlements or fishing huts on islands. At Yanburra they entered the eastern arm of the Chuchya

* See *Geographical Magazine* for November, 1876, p. 296.

River, and here Samoyedes were met for the first time. Dr. Finsch considers that, though they and the Ostyaks differ in regard to language, they are practically the same people from an ethnological and typical point of view. From Yanburra the travellers ascended the Chuchya with a reserve of Samoyedes and Ostyaks. The stream was broad and for the most part deep at that season of the year, but its numerous windings made navigation very slow. On the 28th the natives declared that the vessel could proceed no further, owing to the increasing shallowness and the presence of rapids. This determined the travellers to send back the *lotka* to the Lower Chuchya against the subsiding of the waters. The following day the journey over the *tundra* commenced in three sledges drawn by reindeer. These tundras consist of dwarf birches and moss in the higher parts, and mere swamp in the lower parts, the latter being of course almost impassable. The Ural range is seen bounding the horizon to the west, but the Samoyedes appeared to have no distinguishing name for it.

On the 1st of August the first stream belonging to the northern watershed was crossed, and the same day the Poderata River was reached. The travellers were compelled to return when within 10 miles of the Bay of Kara, as the absence of a boat, lack of provisions, and the impassable nature of the country, rendered further progress impracticable. To the left the Poderata was bounded by a range forming apparently a spur of the Ural chain; the stream itself, according to native account, lost itself in vast marshes, which discharged themselves into the sea.

The return journey was commenced on the 6th of August, and three days afterwards the limit of trees was reached, this being placed too far south on our maps. The Chuchya River was scarcely to be recognised; it had shrunk to the dimensions of a mere mountain-stream. On the 11th of August the travellers regained their boat at Chorneyar, and on the 19th re-entered Obdorsk.

Dr. Finsch remarks that their collections and notes cannot fail to be of value, and that even from a practical point of view it was important to have determined the question of a canal between the Chuchya and the Poderata, with a view of connecting the basins of the Ob and the Sea of Kara. This scheme is quite impracticable, owing to the frozen ground one would have to cut through, and on which a high atmospherical temperature does not seem to have any effect.

Dr. Finsch mentions that, in the course of their travels on the Ob, they met with a M. Polyakoff, who had taken a series of interesting photographs of Samoyede and Ostyak types. They also fell in with the 'Moscow,' a schooner chartered by the members of the Russian Society for the Promotion of Maritime Interests, who were desirous of examining the Gulf of Ob. Such a survey, as Dr. Finsch remarks, is very much needed, but to attempt to carry it out with such a crew and vessel is mere folly, and it was hardly to be wondered at that the 'Moscow' should soon after have been wrecked near Yanburra.

The Germans also met with the expedition under M. Matweyef, sent by the St. Petersburgh Society for the encouragement of Russian commerce to survey the water-parting between the Poderata and Chuchya. These gentlemen had ascended the Chuchya higher than the Germans, and had travelled 17 versts down the Poderata. Dr. Finsch does not state what opinion they formed regarding the possibility of uniting the two by a canal.

THE TEMPERATURE OF THE ATLANTIC OCEAN.

APPENDED to the last report (No. VII.) on Ocean Soundings and Temperatures obtained by H.M.S. 'Challenger,' and issued by the Admiralty, is a general summary of Atlantic Temperature drawn up by Staff-Commander T. H. Tizard. To those who care to investigate the principles by which the movement of the mighty waters are governed, even this summary will be found deeply interesting; and to others not engaged in tracing out these great physical causes, the knowledge of the thermal state of the deep sea cannot be without some interest, inasmuch as we have never had a series of observations so complete, or which could be so depended on, as those from which this summary has been derived. As the author himself was the observer, and had, as it were, a personal knowledge of his instruments, the remarks are of the greater value, and although, to some, the results deduced from these observations may not be conclusive, they cannot but acknowledge that the matter has been studied by Staff-Commander Tizard with much care and thought.

The want of space precludes our giving this paper *in extenso*, but we may extract such portions as will convey a general idea of the entire scope of the paper. Captain Tizard remarks, that "over a great portion of the Atlantic, the bottom temperature has this peculiarity. If the depth be less than 2000 fathoms we find the temperature at the bottom lower than that of any intermediate depth, but when the depth exceeds 2000 fathoms we find that the bottom temperatures are nearly the same as they are at that depth, no matter how much the depth may exceed 2000 fathoms, and this holds good for three-fourths of this ocean. In the remaining fourth the temperatures obtained at the bottom are much lower than in the other parts, and this fourth is not at either extreme where there is a large amount of surface cold, but occupies the whole of the western portion of the South Atlantic as far north as the Equator."

"If an imaginary line be drawn from French Guiana to the westernmost island of the Azores, and from thence due north, on the western side of this line the extreme range of our temperatures, at depths exceeding 2000 fathoms, is only 1°, viz.: from 34°·4 to 35°·4. Thirty-two observations of bottom temperature at these depths were obtained in this portion of the Atlantic." Rejecting three exceptional readings, "the extreme range of the remaining twenty-nine observations will be only 0°·6, viz.: from 34°·7 to 35°·3, and their mean will be 35°; and of these twenty-nine observations, sixteen only differ 0°·2. We therefore think ourselves justified in assuming that in that portion of the Atlantic west of the imaginary line the bottom temperature at depths exceeding 2000 fathoms is uniform at 35°."

On the eastern side of the imaginary line "twenty-seven observations of bottom temperatures were obtained at depths exceeding 2000 fathoms." The

extreme range being 1°, the mean 35°·3, "we think ourselves justified in assuming that in this portion of the Atlantic the bottom temperature at depths exceeding 2000 fathoms is uniform at 35°·3."

"Between Tristan da Cunha Island and the Cape of Good Hope four soundings were obtained at depths exceeding 2000 fathoms, and here the bottom temperature was much colder, ranging from 32°·9 to 34°, the mean being 33°·5. It is, therefore, nearly certain that the uniform bottom temperature of 35°·3, which extends in the whole of the eastern portion of the Atlantic, does not extend further south than an imaginary line joining Tristan da Cunha with the Cape of Good Hope."

"It will thus be seen that a nearly uniform bottom temperature is found over three-fourths of the area of the Atlantic. In the remaining fourth, viz.: from the east coast of South America to a line joining Tristan da Cunha with Ascension, and from the Equator to the southward, the bottom temperature was invariably colder than that of any intermediate depth, no matter whether the depth was 500 or 2900 fathoms; and this temperature was found to vary from 31° to 33°·5, a bottom temperature of 32°·4 being found as far north as latitude 1° 45′ S., in 2475 fathoms between St. Paul's Rocks and Fernando Noronha Island; and another of 32°·7, in 2350 fathoms in latitude 2° 42′ S., between Ascension and the Equator."

"It appears, therefore, that the highest bottom temperature obtained in this portion of the South Atlantic (where the depth exceeds 2000 fathoms) is colder than the lowest bottom temperature obtained in any other part of this ocean (excepting close to the Faroe Islands), and that a temperature of 32°·5 extends in the western point of the South Atlantic nearly to the Equator, whilst in the remainder of this ocean the average bottom temperature is 2½° warmer, and this difference appears to be divided by a sharp line, on one side of which we get the cold water, and on the other side the comparatively warm water."

The cause of this division, Staff-Commander Tizard thus accounts for: "that there are a series of ridges dividing the bed of the ocean into two basins, one of which occupies the whole of the western portion of the North Atlantic, whilst the other extends the whole length of the ocean on its eastern side; and that the cold water in the western portion of the South Atlantic is due to there being no obstruction between the bed of this portion of the ocean and the bed of the Antarctic basin; in fact that this is a kind of tongue of the Antarctic basin. For example, if the direction of the imaginary line from French Guiana to the Azores, and from thence northward, be followed on a chart showing the soundings obtained in the Atlantic, it will be seen that close to this line, and along its whole extent, there are a series of soundings of less than 2000 fathoms; these soundings are not sufficiently numerous to prove by themselves alone the continuity of the ridge of less than 2000 fathoms in depth, but, taken in conjunction with the bottom temperatures, they may be considered as being sufficient evidence."

"Between Ireland and the south point of Greenland are a series of soundings of less than 2000 fathoms; and the ridge stretching north from the Azores meets the other ridge between Iceland and Cape Farewell, and so incloses a deep basin in the western part of the North Atlantic, the water in which is cut off from the cold stream at the bottom of the tongue of the Antarctic basin. This ridge is called the *Dolphin Ridge*."

"Between Tristan da Cunha and Ascension is a ridge of less than 2000 fathoms (now called the *Challenger Ridge*), which extends the whole distance between those islands; and from one or two other soundings obtained north of Ascension by the 'Hydra' and German frigate 'Gazelle,' this ridge may be extended in a N.N.E. direction from Ascension to a position in about 2° S. and 10° W. Between this position and St. Paul's rocks various soundings have been taken, nearly all of them under 2000 fathoms."

"Westward of St. Paul's rocks towards the Dolphin Ridge there are no soundings, but it is probable that the ridge continues in a W.N.W. direction, as north of this line the bottom temperatures are 2½° warmer than they are south of it. This is called the *Connecting Ridge*."

"From Tristan da Cunha there also appears to be a ridge running irregularly to the north-eastward, to the African coast. Only two soundings have been obtained on it, one by the 'Hydra,' of 1800 fathoms, and the other by the 'Gazelle,' of 1950 fathoms. But as all the temperatures south of the ridge are more than a degree colder than those north of it, we may conclude that it is continuous between the two places."

"This view of the division of the Atlantic into basins is also confirmed by the serial temperature soundings; for if the mean of the temperatures obtained at depths below 1000 fathoms be taken, either in the North or in the South Atlantic, the curve of these mean temperatures will be very nearly a straight line, which, if produced, gives as the least depth at which the mean bottom temperature of the Atlantic basins should be found, and, consequently, the greatest depth of the ridges separating those basins from each other, and from the tongue of the Antarctic basin. The following table shows the mean temperature, &c., of the South Atlantic at depths exceeding 1000 fathoms:—

Depth in fathoms.	Number of Temperature obtained.	Maximum Temperature obtained.	Minimum Temperature obtained.	Mean Temperature
		°	°	°
1,100	18	38·5	35·0	36·64
1,200	17	38·2	35·0	36·52
1,300	19	38·0	34·8	36·26
1,400	16	37·6	34·5	36·16
1,500	19	37·3	34·2	35·94

"The same process applied to the temperatures of the North Atlantic gives nearly similar results, as shown by the following table:"—

Depth in fathoms.	Number of Temperature obtained.	Maximum Temperature obtained.	Minimum Temperature obtained.	Mean Temperature
		°	°	°
1,100	40	39·1	36·6	37·72
1,200	40	38·4	36·4	37·34
1,300	37	37·8	36·2	37·03
1,400	35	37·3	35·7	36·70
1,500	36	37·0	35·5	36·46

"Both these curves would (if projected) cut the temperature of 35°·3 at the same depth, viz.: 1850 fathoms."

"As this is the mean bottom temperature of the eastern basin of the Atlantic, this appears to indicate that the ridge which separates this basin from the western basin of the North Atlantic as well as from the western part of the South Atlantic cannot exceed 1850 fathoms in depth, and that in this basin the temperatures from that depth are uniform to the bottom."

"The temperature line of 35°, or the mean bottom temperature of the Western Atlantic basin, is reached at the depth of 2000 fathoms by the mean temperature curve of the South Atlantic, and at 1950 fathoms by that of the North Atlantic. This shows that the ridge separating the Western North Atlantic basin from the South cannot exceed the depth of 2000 fathoms, and that from that depth to the bottom the temperatures in this basin are uniform."

"In both the longitudinal sections obtained in the North Atlantic the water on the western side is warmer in the surface layers, and colder in the bottom layers, than it is on the eastern side: the relative temperatures and depths in the sections from Bermuda to Madeira, and from Sombrero to Tenerife will be seen in the following table:"—

Temperature	Depth in Fathoms.			
	Bermuda.	Madeira.	Sombrero.	Tenerife.
°				
70	50	Surface.	90	Surface.
60	330	100	210	120
50	450	450	350	350
40	660	920	770	900

"This peculiarity was not observed either in the equatorial section or in that from the River Plate to the Cape of Good Hope. In the first named the isotherms are all rather deeper in the central part than they are at the extremes, whilst in the last all the isotherms are, if anything, rather deeper on the western than on the eastern side, but they are nearly at equal depths throughout."

"In the meridional section, from Tristan da Cunha to Madeira, the isotherm of 40° was nearest the surface in latitude 21° S., at a depth of 360 fathoms, from thence it descends steadily to 970 fathoms on the north side in latitude 25° 45′ N., and to 500 fathoms on the south side in latitude 32° S. On the polar side of these two parallels, it again rises. . . . . The isotherm of 50 was found at its minimum depth (140 fathoms) on two occasions in latitude 6° S. and 12° N.; between these parallels it descended irregularly to 190 fathoms in 8° N., on the polar sides it also descended to 410 fathoms at Madeira and to 270 in latitude 24° S.; south of this latter position it again rose. . . . . The isotherm of 60° (and all above it) was found closest to the surface in the parallels of 2° 30′ S. and 12° N. On these parallels all the isotherms higher than 60° are confined to depths under 30 fathoms; between them they open out slightly, and occupy a space of 70 fathoms; on the polar sides they also open out, occupying a space of 140 fathoms in latitudes 22° N. and 24° S., after which they again near the surface."

"A close examination of the various sections shows that between the parallels of 40° N. and 40° S. there is a much larger amount of warm water in the North than in the South Atlantic; that the water on the western side of the North Atlantic is warmer above the depth of 450 fathoms than it is on the eastern side, excepting where the Labrador current forces this warm water away from the American coast; that below the depth of 450 fathoms it is coldest on the western side; that in the equatorial regions the isotherm of 60° (and all above it) is much nearer the surface than in any other portion of this area, but that the isotherms below 60° are not similarly affected, more especially the isotherm of 40°, which is as great a depth in the vicinity of the Equator as in any part of the South Atlantic."

These features are thus accounted for: "The power of the sun in directly heating the water below the surface appears to be, even in tropical regions, extremely limited, for we found in latitude 3° 8′ N., longitude 14° 49′ W., the same temperature at 100 fathoms, in April 1876, as we had previously found in August 1873, although the temperature on the surface differed 6°."

"Similar results were obtained in the Mediterranean by Dr. Carpenter in 1870. He found that no matter what the surface temperature was, the temperature at 100 fathoms was always the same as that at the bottom, and the heat given to the surface water decreases as the higher latitudes are reached, until a position is attained where the temperature is that of the freezing point of salt water. As salt water at its temperature of congelation is denser than at any higher temperature, it would naturally sink just before it congeals, and would in time (did no other cause intervene) occupy the whole of the space in the ocean not influenced by the sun's heat. That is, that the whole volume of the ocean, excepting a wedge of the maximum depth of 100 fathoms, would be at about the temperature of the freezing point of salt water. But in considering the effect of the heat imparted to the surface we have also to consider the effect of evaporation and precipitation. Where the heat is greatest, there evaporation takes place quickest, and consequently, although the surface water may be warmer, yet, by reason of its increased salinity, it may be also denser than the water beneath, so that it would sink and impart its heat to the subjacent layers. But the water evaporated is also precipitated, not necessarily in those parts from which it has been evaporated, consequently the salinity and denseness of the surface water depends on at least three factors: its temperature, the amount evaporated, and the amount of rain precipitated. Where the amount evaporated greatly exceeds the amount precipitated, there the surface film, constantly descending, imparts its heat to the water beneath; but where the precipitation is nearly equal to or exceeds the evaporation, there we might expect the warm water to remain on the surface, and the isotherms to occupy but a small space in depth."

"In the equatorial regions it appears that, although the evaporation is very great, still the precipitation is also, as a rule, more than in any other part of the world; so that, although it may not be equal to the amount evaporated, it is still sufficient, in conjunction with the temperature, to prevent the surface film becoming denser than that below, so that the heated water remains on the surface. Were this water to remain in the same position, an excess of evaporation over precipitation would doubtless in time render its

salinity sufficient to cause it to sink; but this surface water is, from the friction of the trade winds, aided by the earth's motion, constantly being propelled to the westward, and, meeting with an obstructing point of the South American continent, is deviated to the northward, so that the greater part of this heated surface film is forced into the North Atlantic with sufficient violence to cause a rapid current to issue from the Strait of Florida, which current is familiarly known by the name of the Gulf Stream; and the impetus thus given to these equatorially heated waters appears to be not only sufficient to supply that stream, but to cause a slower movement to the north-westward outside the islands of the Caribbean Sea, which water eventually joins the southern side of the rapidly moving Gulf Stream."

"If we take the width, depth, and rapidity of the Gulf Stream as being on an average equal to what the 'Challenger' found it when she crossed, on which occasion it was 100 fathoms deep, and running at the rate of 3 miles an hour for a width of 15 miles, this would show that it was discharging a volume of heated water of 4½ cubic miles per hour, or 108 cubic miles per day, into the North Atlantic."

"The salinity of this heated water, as well as that of the water moving to the north-westward outside the Caribbean Sea, is greater than that of the water beneath, so that although, from its temperature, it is lighter than the subjacent layers, yet on becoming cooled from contact with the colder air the density of this water increases until a temperature is reached at which its weight is sufficient to cause it to sink; as this heated layer sinks, it carries down its temperature, which is imparted to the subjacent layers. If the rainfall was sufficient to decrease the salinity of the water as its density was decreased by loss of heat, then, of course, no descent would take place; but the rainfall of the temperate regions, into which this heated water is discharged, appears to be by no means sufficient to accomplish this; and although, no doubt, some effect might be traced on the salinity, it is very slight, so that the immense quantity of warm water constantly being discharged into the North Atlantic, and as constantly sinking as it becomes cooled, appears to be sufficient to increase the temperature and density of the whole column of water in the temperate zone of that ocean, consequently the isothermal lines are found there at greater depths than elsewhere."

"That the column of water in the temperate regions of the North Atlantic is heavier than in any other part appears to be not only proved by the determination of specific gravity made on board by Mr. Buchanan, but also from the fact that its weight is sufficient to cause an outflow at the bottom of the Atlantic basins on all sides, as we find in the western part of the South Atlantic, where undoubtedly Antarctic water flows at the bottom as far north as the Equator; that the cold stream is almost entirely confined to depths greater than 1900 fathoms or, in fact, to depths greater than that of the ridges separating the basins of the Atlantic from each other, and from the Antarctic basin; and that at and above this depth of 1900 fathoms the temperature is 35°, or nearly the same as that of the Atlantic basins."

We have, for the purpose of brevity, taken some liberties with the original paragraphs, but trust we have conveyed the general idea so ably sketched out by the author on this important subject; and although, as before remarked, the conclusions drawn may not be received by some, it will doubtless raise a question that will greatly advance our knowledge of the physical condition of the deep sea.

J. E. DAVIS.

THE AGE OF THIS EARTH.

AN able article in the *Quarterly Review* for July 1876 gives the calculations of several sciences, differing from one another by tens and hundreds of millions of years, on the age of our cosmical system.

Physical Geography was not represented; we claim for it, not only as great a knowledge of facts in reference to the main point as any other science possesses, but the means of enabling us to point out, where sciences seem to be in error as to time, to data, and consequently in their complex calculations.

Mathematicians are so correct in their figures, that when they start from one point to reach one end, their ends ought to be the same; when these ends vary, and we find no fault in the calculation, we must look into the data for the cause of variation and error.

The article alluded to gives us an outline of cosmical beginnings from the theory of Laplace, published in "1796" (Maunder). Astronomers had been aware that many nebulæ floated in space; these became "specimens of worlds in making," under the powerful telescope of the French astronomer. As the nebulæ became denser, they came under "the action of gravity," consequently "a succession of rings, concentric with and revolving round the centre of gravity," were formed. "Each ring would break up into masses, which would be endued with notions of rotation, and would in consequence assume a spheroidal form. These masses formed the planets, and gathering with energy round its centre formed the sun." It is then explained, "that the earth could not have had an independent existence till long after that time . . . . for before then the earth must have formed part of the fiery mass of the sun." The *Quarterly* observing: "Thus probably was the world we live in, and the solar system of which we form a part, evolved out of chaos."

Science has proved that motion causes heat, and therefore the sun was provided with a supply by the action of the nebulæ. If they were cold when they came together, the only condition they could have been in, the supply of heat was calculated to last for 20,250,000 years at the present rate of consumption. Thus "the dynamical theory of the sun's heat renders it almost impossible that the earth's surface has been illuminated by the sun's rays many times ten millions of years; and when we consider underground temperature, we find ourselves driven to the conclusion that the existing state of things on earth, life on the earth, and all geological history showing continuity of life, must be limited within some such period of time as 100,000,000 years." This authority, Sir William Thomson, is reported to have told the British Association at Glasgow, that "50,000,000 years is an even estimate" for the age of this earth (*The Mail*, 8th of September, 1876).

A comfortable margin of 50 per cent. seems convenient to the precise sciences. Professor Tait is reported to have said in a late lecture at Glasgow, in alluding to differences on this subject, "so much the worse for geology as at present understood by its chief authorities, for physical considerations render it impossible that more than 10,000,000 or 15,000,000 of years can be granted." Before entering on physical details it will be as well to point out a curious position between mathematicians and geologists in reference to "underground temperature." Some geologists assign all igneous action on this earth to local chemical causes; but the fashionable school allows its ignorance on this subject in the *Text-book of Geology* by Mr. Page, seventh edition, p. 51: "The occurrence of volcanoes, earthquakes, escapes of heated vapours, and thermal springs, are by far too numerous and general to be accounted for on any principle of chemical union with which we are acquainted." In other words, the expenditure of heat from the earth is supposed to be more than local chemical causes could supply. Mathematicians give "20,250,000" years of heat to the sun; as this earth is supposed to have been an offshoot from its "fiery mass," we may infer, that when the earth was detached, it must have been in the same hot condition as the parent mass. Mr. Proctor gives us the diameter of the sun at 850,000 miles, and Guyot's geography gives the diameter of this earth at 8000 miles. If, then, the diameter of the sun contains heat for 20,250,000 years, the diameter of this earth can only hold heat for 190,588 years. We know nothing of fresh supplies of fuel to earth or sun, in reference to the theory of Laplace; we give the sun the credit for greater expenditure of heat than the earth; but if geologists are right in supposing that local chemical causes have been unequal to earth's expenditure, and that this has been going on for 10, 12, 50 or 100 millions of years, according to the calculations of physical science, we may wonder why the internal fire did not become bankrupt long ago. We may also remark, in passing, that if igneous action is of any advantage to this earth, it is lucky that neither science had any hand in its origin.

It was pointed out by the German metaphysician Kant, and has been accepted by others, that there has been a retardation of the earth's revolution from the tidal wave. The conclusion, as given in the *Quarterly*, is "she was rotating at about the same rapidity as now, when she became solid, and as the rate of rotation is certainly diminishing, the epoch of consolidation cannot be more than 10 or 12 millions of years." This calculation cannot be of much consequence to the cosmical system; but as no one knows how the tidal wave acted, before there was land for it to flow and ebb upon, we put the theory down as useless, and accept the tidal action as a part of the dynamical action, that helps to keep the whole sphere in equilibrium.

We now come to a mixture of mathematics and geology. The late Sir Charles Lyell, calculating from the present growth of the dry land, put the age of this earth at 300,000,000 of years, the fossiliferous strata at 240,000,000, and the glacial epoch at 1,000,000 years ago.

The earnest and accurate mathematician Croll endeavours to modify the geological epochs by a calculation "at once beneficial, simple and complete. . . . . The land has been many times under the sea, and the most violent changes of climate have succeeded one another." Causes are produced to show "that every 10,000 years or thereabouts the winter of the northern hemisphere will occur, ... whenever any records are left of the glacial epoch, a general subsidence of the land followed closely on the appearance of the ice, ... the extent of submergence will be in proportion to the weight of ice, ... glaciation would be transferred from one hemisphere to another every 10,000 years. There would be elevation of the land during the warm period, and subsidence during the cold."

The article goes on to tell us, that "the discovery of Mr. Croll upsets the whole scale of geological time." Croll gives four periods of glaciation, the last of which was 200,000 years ago; so that the glacial period is reduced to that age—the date of the fossiliferous rocks to 48,000,000, and the age of the earth to 60,000,000 of years.

All glacial epochs are supposed to have left their marks behind them. Croll says they occur every 10,000 years; but the writer of the article has left out twenty of these periods, and selected one of Mr. Croll's without knowing whether Sir Charles Lyell referred to that particular period or to another, which Croll tells us took place 850,000 years ago. As figures go in this matter, Sir Charles would have a very small margin of 150,000 years, if he worked on the traces of this period. The writer of the article seems to have had an object in his figures, by reducing them as nearly as possible to his own.

We must now consider two more facts brought forward by Croll in support of his calculations.

First: "The land has been many times under the sea." . . . . "The submergence will be in proportion to the weight of ice." The latter quotation cannot be proved, ice vanishes, and its weight cannot be known. Submergence of land takes place all round the world. The causes are soft foundations and growing superstructures, pressures, sinkings below water, sedimental gatherings, gradual risings, and the repetition of the same actions till a solid foundation is secured. When foundations are undermined by subterranean water-action, submergences of surface areas occur suddenly, and the rising again is uncertain.

Second: "Violent changes of climate have succeeded one another." Opinions vary as to the cause of this in the Arctic regions. Some follow Mr. Croll in his see-saw theory, or the oscillation of the Poles. If it takes place, changes of climate must ensue; but a very material point seems to have been forgotten—if the oscillation is cosmical, the water would go down with the land; there would be no submergence. There would be 10,000 years of ice, and 10,000 years of warmer climate. These changes would be general, but the fossils of warmer regions do not prove a general growth, neither do the warm region drifts of the present prove a general action through the Arctic regions. In the late Arctic expedition it was colder on one shore of Smith Sound than on the other, and Captain Sir George Nares gave his experience of the Arctic and Atlantic Oceans to the Royal Geographical Society.

In the Atlantic Ocean there is "an enormous reservoir of heat." This warm water is forced "gradually towards the northward and eastward, modifying

the climate of all parts lying in its course. There is also a warm current ever running to the northward through Behring's Straits." These warm supplies run at present through certain channels, while in other channels "an icy cold current" runs to the southward. The Polar basin has a "warm stream of water constantly pouring into it between Spitzbergen and Norway, and a cold icy one as constantly running out between Spitzbergen and Greenland, also . . . . between Greenland and America; . . . . . so great is the difference of climate caused by these powerful distributors of heat and cold, that the temperature of the sea . . . . 2200 miles from the Equator is precisely the same as that nearly double the distance from the Equator."

As we have these cosmical actions, guided by fixed cosmical laws, perpetually circulating the heat and the cold—not always in the same channels, but distributing both according to the direction of either current—we find a certain cause for the "violent changes of climate" alluded to, instead of the more than uncertain oscillation, with the doubtful results of Mr. Croll. We cannot agree with the author of the article in the *Quarterly*, or allow that this glacial theory in any way interferes with geological time, as laid down by the late Sir Charles Lyell. Having thus disposed of certain details as to the age of this earth, we must now briefly consider the position of our geological science on this point.

Properly speaking, geology is a discourse of things on or in the earth, of things tangible and visible. In accepting the theory of Laplace, the foundation of their science is neither tangible nor visible. It suited geology to adopt it, because, in the prevailing ignorance of natural laws, it seemed to explain the causes of certain phenomena. Now that a more accurate knowledge of cosmical law is creeping up, there is no excuse for adhering longer to a theory which is incapable of explaining the cause of igneous phenomena on or in the earth, while it is made ridiculous by the little figures of the mathematicians.

We cannot meet the dogmas of science on this subject, because we think with a finite mind in an infinite beginning; but we ask geologists and mathematicians to follow us through a brief tracing of the cosmical laws and their actions from that beginning, as far as that has been revealed to us till now.

There was a void chaos of waters without form, and dark; how long this earth remained in this condition we do not know. A water-bed was formed, light was given, motion, day and night ensued, revolution on its axis had commenced and continued to this sphere its hours of labour and of rest. Another result followed the presence of light—water was attracted by it, as it is to day; the water-clouds were collected in the firmament, and were divided from the waters under the firmament; all this law is in force now, but no one can say how long a time elapsed before the action became perfect and complete.

As the light caused a movement in the waters, so the waters acted on their bed. No one can say where the general level of that early bed was. But as it deepened from the ever-acting erosion of the waters they were of necessity gathered unto one place, and the bed which they had rested on became dry land.

No science can tell when this happened; we do not know where the first water-level was, the level of the dry land, or its locality; no one knows when light first shone upon earth, or when it first divided the waters; we cannot say how long the atmosphere and the water were occupied in forming the silicious nucleus of our earth, but we know that it gives silicious matter now. We cannot tell when the water was separated from the atmosphere, or how long the atmosphere retained in itself the elemental constituents of water and of earth. The mathematician and geologist have nothing to do with the subject before this event took place: there is nothing visible or tangible, no data for a single figure. The moment dry land is created the physical geographer begins his labours. They are not difficult; he knows the uncertain forces that work under cosmical laws on for-ever-changing materials; by knowing the results at present, he can tell those of the past. Far be it from us to suggest infallible action; we can but give a faint outline of the whole, but we give nothing that cannot be verified by the law and its actions at the present moment.

The geographer looks through time upon the face of the first dry land; he sees the watersheds giving out their little trickles, all running down the slopes, all wearing away something in their course, all depositing some atoms on their way, and all carrying on to their little estuaries or deltas a constant succession of minute atoms. He sees the deltas constantly extending by the addition of atoms, and constantly rising in consequence of the retiring of the waters. He sees constant additions to the dry land made by the water in one place, and constant abstractions in another; he knows that every atom taken from the water-bed makes that bed deeper, and every atom taken from dry land helps eventually to extend its shores.

Under these actions he comprehends that the dry land must have gone on growing, and that the undulating ocean-bed must have grown deeper where its currents ran, and shallower where they did not; he traces the gradual growth of these shallow places, not by any forcible elevation of the mass, but by the slow departure of the water, by the sediments left upon them, by the eventual growth of vegetation, by the creation of life, by the elemental forces for ever returning to their dusts, in some regions or another, to the extending deltas, and the growing dry land.

He looks upon the mud and sand-banks of to-day, and sees the same forces at work under the same laws; he knows that these forces acted under the same laws at the beginning, and he knows that they acted on the materials then available as they act on the materials of to-day. He marks through legends, history, and his own experience, the denudations and the additions of the sea-shores; he finds that in thousands of years the general contour of the dry land has remained the same; he finds localities have been added to and taken away. In these subtractions he sees the fossil remains of prehistoric organic structure torn from their resting-places in the calcareous rocks, he handles the flint nodule formed from the silicious dusts of diatoms and foraminiferæ, and finds the same dusts in course of deposit in the deepest parts of the ocean, telling him not only that these organisms have continued their races for millions of years, but that they have, for all those ages, left their dusts to subside upon the ocean-bed, certain evidence that the site on which we find the stratified calcareous

rocks, with their lines of flint nodules, was once the ocean-bed. He may look on the sand collections now on our surf-beaten shores, on the wind-drifts of the great deserts, and on the sand-dunes in many regions; he does not know when they began to grow, but he sees on mountain-sides sandstone rocks several hundred feet in thickness, many miles in length and breadth. He knows that they were formed and gathered by the same forces that now occupy hundreds of years in adding a few inches to the shores, and he is lost in thinking of the vast amount of silicious matter broken up, triturated into sand, and deposited by the water on its bed, and that bed hundreds of feet above his head. He finds the hard silicious rock in stratified form on the tops of our highest mountains, in their interior, and in the deepest seas, where it still wears away, and contributes atoms for deposit in other places. He is lost in the time occupied by the deepening of the sea, by the vastness of the deposits formed by it, far above its present surface-level, and by the extent of deposit now in progress in its depths. The geographer knows that every river is always bringing something to its estuary, yet its growth of dry land is very slow; he measures it, but he cannot tell by that measurement when the estuary of the Nile was 4000 miles from its present site. He may trace the Mississippi from its present watery delta back to its tributaries in the Rocky Mountains, but it does not tell him when these, now great, waters trickled as little rills from the first dry land of those regions. He looks upon the water-worn chasms of the Himalayas and the Alps, on the vast gorges of great rivers, he cannot say when those rivers began to run, or how long it took them to wear away the hard obstruction to their course, any easier than Sir Charles Lyell could tell the age of the Niagara Gorge.

He may see the vast structure of the coral insect now growing over thousands of miles in the Red Sea, but he does not know when those structures were commenced. He sees the stupendous mass of the Dolomite Mountains, he knows that these were all lodged as sedimental matter, where they now stand, by the same water-forces which had previously built up the silicious Alps; that all the materials of which they are formed were brought atom by atom, just as atoms are lodged on our sea-coasts to day, by the waters, which were then deeper than the mountains are high, from places on the sea-bed which were shallower, places that were washed away, and deepened by the very force that broke up the coral-banks, carried them away, and lodged them where they are. He can form no idea where or when the insects lived that gathered all this calcareous matter from their water, how long it occupied them in constructing their palaces, how long they existed, when they were pulled to pieces, how long they were triturated by current and by wave, or when the atoms were permitted to become deposits.

He may look on the calcareous matter of the Jura Mountains, and know that they are formed from bones and shells of fauna that once lived on land or in the water; he knows that these masses were lodged in water as deep as the mountains are high, in minute fragments, with an occasional entire shell or an unbroken bone, but he knows nothing of the land or water in or on which the fauna lived. He cannot count the time occupied in the formation of these mountains, or tell for how many ages the fauna lived that left their dusts to form them. Wherever the physical geographer turns, he is lost in the lapse of ages. The waters have left their old beds, the land has acquired new dimensions. All dry lands have their high places, from which their watersheds convey their atoms away; every atom helps to extend dry land, the watersheds are the agents for the work, and the great waters are the agents for the separation of matter, and for its deposit in its proper place. All this is done now under certain laws by their cosmical agents, air and water.

No one knows better than the physical geographer the truth of the words used by the writer in the *Quarterly Review:* "In all the operations of nature . . . . God worked by law . . . . by the process of slow development, by means beautifully simple, involving no violence, no haste, yet irresistible." No one sees more clearly the error, ascribed to Professor P. G. Tait, in *The Mail*, 8th January, 1877—"the present state of things has not been evolved through infinite past time by the agency of laws now at work, but must have had a distinct beginning." "When was it, and what was it?"

It is the slow, the certain, the beautiful, and the unchanging process of cosmical law, which gives the character of infinite to the universe. Finite man has not as yet read the pages of the law, and cannot therefore calculate the age of this earth. He has tried over and over again to do so, but Professor Tait is not so near to the truth as Solomon was; other "guesses" (*Quarterly*) may be nearer, but the men who guess are at present without chart, compass, or sounding line on the fathomless and boundless ocean of eternity.

H. P. MALET.

Reviews.

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THE CRUISE OF THE 'CHALLENGER.'*

WE have, in the preceding pages of this journal, given an outline of the proceedings of H.M.S. 'Challenger' in her voyage round the world principally for the purpose of submarine explorations. This expedition, from a scientific point of view, has been considered one of the most important and interesting that ever left our shores, and whether we consider the wide range of investigation which was submitted to the explorers by the Committee of the Royal Society, or the scope it furnished to add to our knowledge of the great depths of the ocean (with a due consideration to the comparatively brief time alloted for such an undertaking), it may be affirmed that the results are eminently successful, although we have not yet had the official account of them

We know that Sir Wyville Thomson has an important work in the press on the purely scientific results of

* *The Cruise of H.M.S. 'Challenger;' Voyages in many Seas, Scenes in many Lands.* By W. J. J. Spry, R.N. Sampson Low, Marston, Searle and Rivington, 1876.

Log Letters from the 'Challenger,' by Lord George Campbell. Macmillan and Co., 1876.

the voyage; and we may hope that, now Sir George Nares has returned from the Arctic regions, we may have a narrative of the proceedings of the expedition, which for the greatest portion of the time he so ably commanded. In the meantime we have before us two works by officers who served in the expedition, and although of varied merit as literary productions, they greatly help each other in bringing before us what was seen and done in the voyage, apart from the purely scientific proceedings and deductions. The first named, by Mr. Spry, who served in the 'Challenger' as an Engineer, is an account of the voyage and proceedings pure and simple, with just so much from personal observation as to suffice for a filling-in between the dates. In the last, by Lord George Campbell, a Sub-Lieutenant of the ship, the author has avoided the technical account of the voyage, excepting in his concluding chapter, and struck out entirely from the routine of the ship to give us an account of all he personally did, saw and thought; but the two books in conjunction furnish us with a very good account of the voyage, although in point of fact they could well exchange titles, the first being far more "Log Letters" and the last "Scenes in many Lands."

We cannot but notice that Mr. Spry is occasionally indebted to our own columns, the extracts from which are unacknowledged; but we think he would have done well to have studied them a little more, as he would have rendered his description of the *sounding rods*, in pages 44 and 45, more perfect, as he also would have done the drawings, had he taken them from the instruments themselves; nor would he have found in our pages that we attributed the invention of one of the sounding rods to "Commander Bailey, R.N.," but to Navigating-Lieutenant Baillie. It is difficult in Mr. Spry's book to find a passage with which we are not familiar from the accounts already published, but we extract one that we do not remember to have seen, of Japan:

"I paid a visit to numerous temples, and in describing the one of Asakusa, which is situated in one of the most populous quarters of the city (Yedo), I shall convey an idea of the whole. This is one of the largest and most celebrated in Tokio. On reaching the locality, we pass on through long avenues crowded with men, women and children. Here, on either hand, are stalls filled with nicknacks of all descriptions, with refreshments, and troughs containing sacred water, with numberless sacred towels flying like so many flags. As we approach the Holy of Holies, a large bronze figure of Buddha is in view, and we pass on to the building, gorgeously decorated in gold and lacquer work, with elaborate and ornamental carved roofs and pillars. The sacred shrine to which the multitude come to pray is protected by a large frame of wire-netting. A curious practice seems in force with the hundreds who pay their devotions here; they purchase from the priest in attendance small squares of paper, on which are inscribed certain hieroglyphics; these they chew for a time and then throw as pellets at the grating (which is consequently covered with the results). And the precision with which these pellets strike the grating or go through the mesh, determines certain inferences as to good or bad luck."

There are some well-executed wood-cuts in Mr. Spry's book.

With the Log-leaves it is difficult to select a passage that is not new and interesting, even though it may be a subject on which others have previously written, and we could scarcely give a better specimen of the style in which it is written than from the first paragraph in it:

"At length we are ready, the last packing-case of science on board, the last good-bye said, the last hawser cast off, a tug tows our bows round, 'Full speed ahead!' and hurrah! we are off on our cruise round the world. We steam out of Portsmouth harbour, through the 'Needles,' and down Channel with a smooth sea and a light head-wind, not long to last though, for in two days' time we got a heavy gale, which shook us all nicely down into our places; close-reefed topsails—ship rolling like mad—sleep at a minimum—scientifics sick—stand-up breakfast—coffee down our boots instead of down our throats—crockery smashing—perfect misery—attempted joviality, &c. And so with a persistent foul wind, blowing sometimes very hard, and sometimes lighter again, and until the last day or two a heavy, confused sea and swell, we jogged uncomfortably on, now beating about under sail, and now steaming head to wind, until the 3rd of January, when we arrived at Lisbon."

Thus of the proceedings. Here is a description in Humboldt Bay, New Guinea:

"But I have lots of things yet to tell you about the savages. As I said before, they are absolutely naked, their colour a dirty sooty-brown, quite unhandsome; and a skin disease, common among these islanders, is common here too, and has the effect as if white pepper or dust had been sprinkled over them. They are not got up in the toggery I have described; many are not painted at all, and have no shrubbery about them. The boys and young fellows shave their heads clean, excepting a narrow 'fore and aft' ridge on the top of the head. Their noses are not pierced either, and many of them have quite pleasant faces. Clean-looking, well-built young fellows these, with grinning white teeth, a pleasant feature which they afterwards spoil, as they do all their features—their nose by a great hole, their teeth by chewing betel-nut, and their faces by hideously painting them. Their shoulders are marked with great lumps, in lines and curves, which they produce by intentional gashes. The bows are about six feet long, a few neatly grafted over with plaited fibre, slightly carved, and strung with a strip of bamboo. The arrows are also made of bamboo, unfeathered, tipped with fire-hardened wood, cut into a series of sharp barbs and ugly notches; the whole tip being more than a foot long. Fancy having that stuck into one! . . . . These arrows are about five and a-half feet long. Their daggers are made from the leg-bones of cassowaries, a piece from which is sliced off, the rest ground into a sharp point."

At Valparaiso the author left the ship and crossed the Andes; here is the view from the highest pass:

"And now we are at the top of the pass—the Cumbre; 12,656 feet above the sea, and 5 miles from the Yunequal rancho. The scenery was of course magnificent, but still disappointingly magnificent to me. Behind us lay a chaotic heap of mountains, the lower ones coloured all shades of light and dark ochres, or dusty grays, the ravines between them lying in shadow, while the higher blocks, some close to us, some far away, were coloured purple, veined, or capped with snow. In front and far below us lay a valley, with level river-threaded bed making away to the left, its course, to our right being hidden by a shoulder of the ridge on which we stand, bounded by sterile yellow and red-coloured mountain ridges, which immediately in front of us rose in a great black mass, through which in the face of the precipice ran a broad band of white (quartz?) rock."

We are much tempted to add other extracts, but want of space forbids; we will, however, add a short statement, as it may help to throw some light on the much-vexed question of the cause of scurvy in the Arctic Expedition:

"At the bottom of this, D. and his surveying party were once imprisoned for three months by walls of snow, which blocked the valley to such a height that scaling the mountain flanks was impossible; but at last, when only a small sack of beans was left, D., weak with scurvy, managed to crawl round the snow-wall, and so got intelligence of their plight conveyed to Mendoça, whence pack-mules with provisions were sent, just rescuing the party in time, for all were down with scurvy, and one man was as nearly gone as possible."

To those who are aware of the nature of the 'Challenger' voyage, and fear in Lord George's book a scientific manual, we can assure them that they will be agreeably disappointed, for a more interesting and amusing book of travel we have not perused for some time.

QUARTERLY REVIEW, January 1876. Art. V., p. 146. Geographical and Scientific Results of the Arctic Expedition. (Murray.)

WE welcome this article in the *Quarterly Review* as an expression of the matured opinion of the vast majority of our countrymen. "Though our explorers did not reach the Pole," says the Quarterly Reviewer, "they achieved many of the scientific results that those most able to judge think possible or necessary, and, what is far better, have exhibited to the world a model of quiet heroism under privations the extreme nature of which are by no means as yet generally known. Like noble fellows as they are, they would not have hesitated to remain, if any good purpose could be served by doing so." Speaking of the journey of Captain Markham, the reviewer says—"He did all that mortal man could do, and, to say the truth, all that he was meant to do, in planting the British flag in the highest latitude ever reached by man. The heroism of the sledge-crews was magnificent. Overworked, overtired, borne down by the weight of a dreadful and depressing malady, cold, hungry, they struggled on. It was not till they were utterly exhausted that they turned their faces towards the ships. Surely nothing finer was ever recorded than this advance of three sledges, one to the north, another to the east, a third to the west, laden down with sick and dying men, in obedience to an order to do their best, each in their separate direction. And nothing more touching was ever penned than the narratives, full of tenderness and simplicity, in which the sailor-writers tell their story. There are some defeats which are more glorious than victories; some failures which are grander than the most brilliant success. These gallant seamen have failed to reach the Pole, but they have won a proud place in their country's annals."

The review contains a most interesting *résumé* of the important results to be obtained from Arctic exploration, which will, we have no doubt, have an important effect in proving to the public that further research is desirable; yet, with strange inconsistency, the reviewer himself seems inclined to advise that we should "rest on our oars."

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BOLETIN DE LA SOCIEDAD GEOGRÁFICA DE MADRID, No. 1. Madrid, 1876. London (Trübner & Co.).

WE have received the first number of the *Boletin* of the Geographical Society of Madrid, founded on the 2nd of February, 1876, by Senhores D. Francisco Coello, D. E. Saavedra and D. Joaquin Maldonado Macanaz, and numbering already more than 600 members. The first number of the *Boletin* contains an account of the preliminary meetings at which the Society was constituted. The *Boletin* is to be a monthly publication, but there will likewise be a *Coleccion Geográfica*, to be published at irregular intervals, as materials accumulate. The Committee of the Society has not only laid down rules for spelling geographical names, but has actually adopted a new initial meridian, which is to pass through the Punta de la Orchilla on the Island of Ferro, long. 20° 30′ W. of Paris, or 18° 9′ 46″ W. of Greenwich. Surely it would have been better to accept the meridian of Greenwich or of Paris pure and simple, or to adhere to the conventional meridian of Ferro, which is merely a meridian of Paris in disguise, drawn 20° to the west of Paris. As to the rules for transcribing foreign names, they are perhaps a trifle more complicated than they need have been, and several of the diacritical signs might certainly have been dispensed with, but we hope they will be strictly adhered to until some better system meets with universal acceptance in the geographical world.

AN ESSAY ON NEW SOUTH WALES, the mother colony of the Australias. By *G. H. Reid.* Sydney, 1876. London (Trübner & Co.).

THE International Exhibition at Philadelphia has been the cause of the publication of several valuable statistical and geographical memoirs on different countries. We recently had occasion to notice the monograph issued by the Government of the Empire of Brazil; and we now have before us an equally exhaustive work brought out under the auspices of the Government of New South Wales. Mr. Reid, to whom the compilation was entrusted, has succeeded in compressing a very large amount of useful information into a comparatively small compass, and we have pleasure in recommending this essay as a valuable handbook. It treats first of the boundaries, physical aspects, and population, which are the bases of all statistics, and then proceeds to furnish well-arranged details respecting the political arrangements, finance, communications, land tenures, agriculture, mines and manufactures, commerce and shipping, moral and intellectual condition, and defences. We specially commend the system of arrangement, which coincides with that adopted in the Reports on the Moral and Material Progress of India for the years 1871-72 and 1872-73.

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DREI MONATE IM LIBANON. Von *Professor Oscar Fraas.* Stuttgart, 1876. London (Trübner & Co.). 8vo., pp. 108.

PROFESSOR OSCAR FRAAS visited the Libanon, in 1875, by invitation of Rustem Pasha, and for the purpose, more particularly, of examining into its geology. The little book now published presents us with a popular account of the Professor's journey and with a description of the Libanon district and its inhabitants. The first three sections have already made their appearance in a newspaper, whilst the fourth, general, section is based upon notes prepared for the purpose of lectures. The author has done well to republish these letters and lectures. They abound in interesting matter, and anthropologists more particularly will find much in them deserving their attention.

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REVUE GÉOGRAPHIQUE, dirigée par *M. Ludovic Drapeyron.* Paris (Thorin). London (Trübner & Co.).

WE have received the first number of a new French Geographical Review, which cannot fail to achieve a success, if the promises held out in the prospectus are realised, and the contributions continued of the same high standard as those contained in this specimen number. The list of French men of science who have promised to support this new venture is large, and it includes many names favourably known beyond the limits of France. We meet thus with the names of MM. Berlioux, Berthelot, Colonel Coello, Cortambert, Daubrée, Delisle, E. Desjardins, Joanne, Levasseur, Malte-Brun, Maunoir, Quatrefages, Elisée Reclus, E. Renan and others. The present number contains a paper on the influence of geography upon political economy, by M. L. Drapeyron; a statistical notice of Roumania and Servia, by M. Levasseur; a paper on the Brussels Congress, by M. Maunoir; and a number of miscellaneous articles. Amongst the papers promised for future numbers there are "Études sur l'Angleterre," by M. Thierry.

ERRATUM.—In number for December 1876, page 317, line 1, *for* + 30, + 12.

Cartography.

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THE batch of maps recently received from India, though bearing evidence to the progress of publication, does not contain anything striking either on account of its novelty or of other features.

The Indian Atlas* has been increased by two quarter sheets published provisionally without the hills. Of Revenue Survey Maps we have received no less than twenty-eight sheets, of Topographical Maps ten sheets, and of maps published by the Superintendent of the Great Trigonometrical Survey seven sheets, being a total of forty-five sheets; all of them presenting us, for the first time, with the results of surveys recently terminated or still in progress. The Revenue Survey of Assam† is represented by fifteen sheets of the District of Goalpara, surveyed in 1867-69 and 1873-75, during the former years by Mr. J. H. O'Donel, during the latter by Major D. MacDonald. The Index Map which accompanies this survey is drawn on a scale of 4 miles to an inch; hills, altitudes, and boundaries are to be found upon it, and it admirably answers the purposes of a special map. One sheet has been added to the Map of Bhawulpore.‡ It is from surveys made in 1869-74 by Captain H. C. B. Tanner and Mr. E. T. S. Johnson, and the level series have been inserted upon it in red. In the Central Provinces maps of the districts of Baitool and Bilaspur§ have been completed, both surveyed in 1872-74; the former by Major R. E. Oakes, the latter by Mr. W. Lane. Both these maps are accompanied by skeleton index maps on a scale of 4 miles to the inch. We are also indebted to the Revenue Surveyors for large scale plans of four towns and cantonments. Captain G. Strahan supplies us with plans of Kishengarh, Ajmere, and Jhalra-Patan (with Gagron Fort)‖, all of them surveyed between 1872 and 1875, whilst Colonels J. E. Gastrell and D. C. Vanrenen have prepared a plan of Moradabad,¶ partly based upon surveys made as long ago as 1864, but revised in 1872.

The Topographical Surveys published refer to Chota Nagpore, the Central Provinces, and Khandeish. The map of the former** has been increased by two sheets, from surveys by Captain G. C. Depree, made in 1863-64. One sheet of the reduced map of the Central Provinces and Vizagapatam Agency Survey†† has been published, embracing three sheets of the one-inch map, and based upon surveys made by Lieutenant T. H. Holdich in 1873-75. The Map of Khandeish and Bombay Native States‡‡ is a new work, intended to replace Major Briggs' map, based upon a survey completed in 1822, and of which several revised editions have since been published. The seven sheets of the new map now issued are very well executed, but possess no feature calling for special remarks. They are from surveys made in 1873-75 by Messrs. H. Horst and F. B. Girdlestone.

Four sheets have been added to the Map of Kattywar which is being surveyed by a party of the Great Trigonometrical Survey of India, commanded by Captain A. Pullen.*

The last map to be noticed is one of Dehra Dun and the Siwaliks,† which is being prepared by Captain F. Bailey, of the Forest Department, and in connection with the Trigonometrical Survey. This map is executed with great care—cultivated lands, waste lands, and the boundaries of government forests are marked upon it.

Professor ARCHIBALD GEIKIE, Director of the Geological Survey of Scotland,‡ has prepared a Geological Map of that country on a scale sufficiently large (about 10 m. to 1 in.) to present no less than thirty-six formations with a considerable amount of detail. In addition to his own surveys and traverses, extending into most parts of the country, the author has embodied into his work the labours of his predecessors and contemporaries. The resulting map is a work of sterling value, which ought to supplant all older maps of Scotland, which are incorrect not only as to details, but frequently also with respect to leading features. The geological data, we ought to mention, have been laid down upon a topographical groundwork carefully prepared by Mr. T. B. Johnston, which presents us with the results of the Admiralty and Ordnance Survey, as far as published.

E. G. RAVENSTEIN.

Log Book.

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The Committee to investigate the Causes of the Outbreak of Scurvy in the Arctic Expedition.—The Admiralty have appointed a committee, consisting of Admirals Sir James Hope, Sir Richard Collinson, and Inglefield, Dr. Donnet, R.N., and Dr. Fraser, to investigate and report upon the outbreak of scurvy. Sir James Hope has no Arctic experience, but, as chairman, he is an officer who is sure to do his work thoroughly and exhaustively, so far as the collection of evidence is concerned. Sir Richard Collinson was Captain of the 'Enterprise,' in which ship he passed three winters in the ice and had personal experience of sledge-travelling. Admiral Inglefield made three summer cruises to Baffin's Bay, but he has not wintered in the Arctic regions. Dr. Donnet was the surgeon of H.M.S. 'Assistance' in 1850-51, and is well acquainted with all phases of Arctic work. Dr. Fraser is a civilian. The labours of the committee are likely to extend over some weeks; as the examination of witnesses will not only comprise the officers of the late expedition, but also many who served in the searches for Sir John Franklin, including McClintock, Richards, and Hamilton; and Drs. Lyall, Toms, Scott and Ede. Some valuable information is sure to be elicited by this investigation, which will be serviceable in the organisation of the next Arctic Expedition. The sittings of the committee commenced on the 11th of January, and will probably be continued until the beginning of February. Among others Commander Cameron will be examined, as he and his people suffered from scurvy during the latter part of the memorable march across Africa.

* Indian Atlas, quarter sheets, 2 N.E. and 52 S.E. (no hills). Calcutta, 1876.

† District of Goalpara (Assam Revenue Survey), scale 1 m. = 1 in. Sheets 1 to 13 and 16. Index map of same, scale 4 m. = 1 in. Calcutta, 1876.

‡ Punjab Revenue Survey: Bhawulpore State. Sheet 111.

§ District of Baitool, seven sheets, scale 1 m. = 1 in. District of Bilaspur, nine sheets, scale 1 m. = 1 in. Index sheets to the above, scale 4 m. = 1 in.

‖ Kishengarh City, Rajputana, two sheets, scale 12 in. = 1 m. City and environs of Ajmere in Rajputana, scale 12 in. = 1 m. City and cantonment of Jhalra-Patan and Gagron Fort, scale 6 in. = 1 m.

¶ Moradabad, cantonment, town and environs, scale 6 in. = 1 m.

** Chota Nagpore, Topographical Survey, scale 2 m. = 1 in. Sheets 11 and 14.

†† Central Provinces and Vizagapatam Agency Topographical Survey, 1 in. = 1 m. Sheets 51, 52, and 53 in *one*.

‡‡ Khandeish and Bombay Native States Topographical Survey, scale 1 m. = 1 in. Sheets 4, 8, 9, 14, 15, 16, and 17.

* Kattywar Survey, scale 1 m. = 1 in. Sheets 31, 42, 43, and 44.

† Dehra Dun and the Siwaliks, scale 1 m. = 1 in. Sheets 4, 9, 19.

‡ Geological Map of Scotland, by A. Geikie. Edinburgh and London (W. & A. K. Johnston).

Canalization of the Darien Isthmus.—The Colombian Government, on the 28th of May, 1876, granted a concession to M. Antoine de Gogorza, of the right to cut a canal through the Isthmus of Darien, in consequence of which the "Civil International Society of the Interoceanic Canal of Darien" was formed in Paris. At present about sixty shareholders have subscribed a fund for the despatch of an exploring commission, the members of which arrived at Panama last December. The President of directors of the Society or Company is General Turr, a Hungarian, who served under Garibaldi; and his colleagues are M. Cousin, a French engineer; M. Rampon, a naturalist who has been much in Colombia; M. de Reinach; and M. Lescanne Perdoux. These directors sent out the Exploring Commission, which is commanded by M. Lucien Napoleon Bonaparte Wyse, a commander in the French Navy, who, in 1868, ascended the River Bayano from the Pacific as far as the dividing range above the Gulf of San Miguel. His father was The Right Hon. Sir Thomas Wyse, H.M. Envoy in Greece, and his mother was Letitia, daughter of Lucien Bonaparte. The other members of the Commission are M. Celler, an engineer, who is in charge of the technical operations; Mr. W. A. Brooks who is to direct the work of boring and the geological researches; M. A. Reclus, a brother of the geographer and an officer in the French Navy, is the hydrographer; Captain Bixio, an Italian officer, is Secretary to the Commission; and fifteen other engineers and topographers complete the staff. The Commission was to leave Panama, in the steamer 'Toboguilla,' on the 11th of December, for the Bay of San Miguel, accompanied by Señor Aizpuru, the President of the State of Panama. Here their labours will commence.

The Census of Peru.—The Minister of Public Works, at Lima, has published a synopsis of the results obtained from the recent census, which was taken under the auspices of the late President, Don Manuel Pardo. Peru is now divided into eighteen departments, three littoral provinces, ninety-two provinces, and 764 districts. There are sixty-two large and sixty-six smaller cities, 1262 towns, 646 large and 5938 small villages. In Tarapaca there are seventy-two nitrate works; and in the whole Republic 4221 plantations, and 12,087 holdings. The total population amounts to 2,673,075 souls, of which 1,352,151 are males, and 1,320,924 are females. The most populous department is Ancachs, containing 284,091 souls. Next follow Puno with 256,594, Cuzco with 237,083, Lima with 226,922, Cajamarca with 213,243, Junin with 209,871, Arequipa with 160,282, Ayacucho with 147,909, Libertad with 147,541, Puira with 135,709, Apurimac with 119,246, Huancavelica with 104,140, Lambayeque with 85,984, Huanuco with 77,988, and Loreto (the Amazon country) with 61,125. The province of Yca contains 60,111 souls, Tarapaca 42,002, Tacna 35,706, Callao 34,492, Amazonas 34,245, and Moquegua 28,786. In Ancachs, Puno, Cuzco, Cajamarca, Junin, Arequipa, Ayacucho, Libertad, Puira, Apurimac, and Huanuco, and in Amazonas there are more women than men. But in Lima and Callao, in Huancavelica and Lambayeque, Loreto, Yca, Tarapaca, Tacna and Moquegua there is an excess of men over women; for these are the parts of the country where there are plantations employing foreign labour, where mining operations are carried on as in Huancavelica and Tarapaca, and where there are large seaports.

Peruvian Geographical Society.—A Geographical Society has been established at Lima, of which Don Manuel Pardo, the late President of the Republic, has been elected President; General Mendiburn is Vice-President, and Dr. Chacaltana and Señor Castañon are the joint Secretaries. There is a vast field for geographical research in Peru, and under the auspices of Señor Pardo the labours of this new Society can scarcely fail to be valuable.

Census of Travancore.—The feudatory kingdom of Travancore, in the extreme south of the Peninsula of India, has followed the example of British India, and completed a census of its people. The enumeration was made between the hours of 6 and 9 A.M. of the 18th of May, 1875, and the population was found to number 2,311,379. It was carried out exclusively by natives of India, most of these belonging to the Travancore State, and their intimate knowledge of the country has enabled them to give details of great interest to the ethnologist. It has also shown the comparative cheapness of native labour. The agency employed consisted of about 12,000 enumerators, but the total cost was only Rs. 42,639, or about seven shillings a head. The census of Ceylon, with nearly the same population, cost Rs. 99,080. In a geographical point of view, the Travancore kingdom merits a notice here. It has attained its present dimensions by absorbing petty independencies, and is ruled by a Kshatrya prince of the Lunar line. Situated in the extreme south of India, it has remained untouched by the successive waves of Muhammadans who have entered India from the N.W., and a large portion of its people follow the law of maternal descent in succeeding to property. The ruling family also still adheres to this law of inheritance.

Vladivostok.—Last year the German corvette 'Hertha' paid a visit to the Russian war-port of Vladivostok, on the coast of Manchuria. The harbour is closed by ice from November to March, and vessels requiring repairs cannot enter it during that period. A submarine telegraph connects the town with Nagasaki and Shanghai, and there exists thus telegraphic connection between that remote place and Europe. It was intended at first to convert Vladivostok into a first-class naval station, but its establishments for the present are limited to a few coal-sheds, a store-house, and a shop for the repair of machinery. The Russian flotilla stationed there consists of ten or twelve advice boats, gunboats and transports, and is manned by about 2500 men. The town itself is of no importance, and the country in its rear offers but few resources. Provisions are imported by seven mercantile firms, of whom three are German. Vladivostok is important, however, as a station from which the Russian plans of colonisation may be supported and directed. This colonisation is now being directed towards Korea. A portion of the female convicts annually transported to Siberia is forwarded to the military stations in this remote corner of Asia, to be employed as servants or otherwise. Many of them find husbands amongst officials or soldiers, and Russian villages are thus gradually spreading towards the south.

The commerce of Vladivostok is, at present, of small importance, and is confined almost to the importation of provisions and of naval stores. In 1872 there entered eighteen vessels of 2789 tons; in 1875, thirty-four vessels of 12,724 tons, of which eleven were German. The merchants appear to do a lucrative business. Gold-washings have been established by a German trading company in conjunction with an American firm, but it is doubtful, as yet, whether the speculation will pay.

The Russians looked forward to the establishment of Vladivostok with great expectations, none of which have hitherto been realised. They evidently hope to be able to establish themselves at no distant period at a spot more favourably situated, either on the coast of Korea, or on the Japanese island of Tsu-sima, which has a safe harbour.

Pundit Nain Singh, the Indian Explorer.—Pundit Nain Singh, the well-known Asiatic explorer, whose successful journey across Tibet and previous exploits were noticed in our number for June last, has been compelled to retire from the service mainly on account of ill-health, contracted during his perilous and trying journeys. He has been recommended by Government for a grant of the fee-simple of a village in Rohilkund, and of a sum of £100 in recognition of his valuable services. We are glad to perceive that these services have not been unrecognised by geographical authorities. From recent proceedings of the Paris Geographical Society, it appears that that body have communicated to our Ambassador their intention of forwarding to him a gold watch for presentation to the Pundit, in token of their admiration of his last exploring achievement. As the gold watch presented to the same individual by our own Society, for his journey to Lhasa and Lake Mansarowar in 1855-6, was unfortunately stolen, this act, coming as it does from a sister Society in a foreign country, will be viewed as a truly appreciative and graceful action.

Sir B. Robertson's Visit to Haifong and Hanoi, in Tonquin.—Sir B. Robertson, Consul at Canton, was deputed in April last to visit the ports of Haifong and Hanoi, which have been lately opened by the French in Tonquin, and arrived in H.M.S. 'Egeria' at the former settlement on the 7th April. Haifong is situated on the right bank of the Cud-cam, a branch of the Song-koi, or Red River, with which it communicates by a canal. Haifong is now a considerable village, with a fair trade in silk, tin, and lac. It is the highest point to which vessels drawing 14 feet of water can ascend the Cud-cam, and for the present is the shipping port of Hanoi, though the Red River offers no insuperable obstacles to navigation, in Sir B. Robertson's opinion. From extensive works going on there, it would appear as if the French intended it to be the anchorage for foreign vessels. Sir B. Robertson called on the Tong-duc, or viceroy, and on the French consul, both of whom appeared to welcome the prospect of British trade. There is much business going on in the town, the shops being well stocked with goods of native workmanship, especially bamboo work, silk and cotton piece goods, &c. Rice is the staple food of the people, who look well-fed and healthy, and have a fair amount of muscular development. The Tonquinese are evidently of an intermediate type between the natives of India and China proper. The population of Hanoi, the capital, is estimated at from 150,000 to 200,000 Tonquinese and about 3,000 Chinese. The principal river, called Song-koi, in Annamese, is said to rise in Tibet, and is navigable from Manghao, the last city in Yunnan, down to the sea, a distance of 414 miles. The borders of Tonquin and Yunnan have for some time been in a disturbed state, being in possession of two clans of Chinese, who are at war. Were the Governments of Tonquin and China to give their consent, and the blackmail leviers cleared out, a good trade would undoubtedly be done, especially in metals, in which Tonquin is rich. In conclusion, Sir B. Robertson considers that there is no fear of the trade of Western China being monopolised by either this route or that *viâ* Bhamo. The more openings there are, he remarks, for the inlet and outlet of trade the better.

Correspondence.

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THE PECHENEGS OR KARAKALPAKS.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Having considered the Berendeens and the Comans, we will now turn to the Pechenegs. Zeuss thus gives their synonymy: they were called Pizenaci by Luitprand, Pecenatici by Cosmas of Prague, and Pincenates, Pecinei, Petinei, Postinagi by other western writers, Patzinakitai by Constantine Porphyrogenitus, Peczenjezi by the Slaves, and Bisseni or Bessi by the Hungarians. This last form of the name probably gave its appellation to Bessarabia. I may add that Snorro calls the people Pezina-vollr.

That the Pechenegs were Turks there can be no doubt, and the position is not controverted. Ibn el Wardi tells us they were "a Turkish race who had separated from the other Turks and settled between the Khazars and Rum." He calls them Behnakije, and tells us that "although they had lived there so long they had not any houses" (Zeuss, *Die Deutsche, etc.*, 743).

Anna Comnena tells us they spoke the same language as the Comani, while Betchena is named as a tribe of the Ghoz Turks who were in Persia with the Seljuki (D'Ohsson, *Abul Cassim*, 177).

Their first appearance in Europe is dated by Constantine Porphyrogenitus about the year 894-899, when, as he tells us, they were attacked by the Khazars and Uzi in alliance, and driven from their ancient seats (Stritter, iii., p. 797). Previously, according to the same author, they had lived on the Atel, *i.e.*, the Volga, and the Geech, *i.e.*, the Jaik, and were the neighbours of the Uzi and Mazari (*id.*). In another place he tells the story in a different way. He says that "the Patzinakitai, who were formerly called Kangar—which name among them meant nobility and strength—having taken up arms against the Khazars, were beaten, and deserted their country, and were obliged to enter the land inhabited by the Turks," *i.e.*, with him the Magyars (*id.*, 798). This name Kangar is clearly a corruption of Kangli or Kankali, and is a similar form of the name to that we find used by one of the missionary friars.

This does not mean that Pecheneg and Kankali were convertible terms. The author already quoted clearly shows this when he tells us that the Pechenegs were not all called Kangar, but only three of their tribes or sections, who were stronger and nobler than the rest (*id.*, 808).

After a while the Kangar Pechenegs quarrelled with the Magyars and defeated them; one section of them were driven to take refuge in the direction of Persia, and the other went westwards towards the Carpathians, and settled in the district of Atelcusu. Cus has been compared with the Hungarian Kōz, an island or piece of land between two rivers, while Atel or Itil is the ordinary Turkish name for river (Zeuss, 751). The country referred to was doubtless the district between the Danube and the Dniester.

The Pechenegs now definitely occupied the old land of the Magyars on either side of the Dnieper. They divided their new country into eight provinces, four of which were west of the Dnieper, and four east of that river. The former four were named respectively, Chopon, which was the nearest to Bulgaria, Gyla, which was nearest to the Magyars, Kharoboe which was nearest to the Russians, Ertem, or Jabdertim as he elsewhere writes it, nearest to Ultin? Derblen? Lenzen? and the other Slaves, *i.e.*, probably the districts of Gallicia and Poland.

The remaining four districts, namely, Tzur, Calpee, Talmat and Tzopon, were east of the Dnieper (*id.*, 806 and 807). Constantine tells us that after some years the Pechenegs once more invaded the land of the Magyars, who, with their chief Arpad, were forced to migrate into Great Moravia, *i.e.*, into the modern Hungary (*id.*, 798, note). And we are further told the Pechenegs occupied the land thus deserted.

Thenceforward they held the steppe-land of the Nogays from the Danube as far as the Don. They occupied the lower reaches of the Dnieper, and effectually closed that river, which had hitherto been the main artery of communication between Byzantium and the Baltic.

The account of Constantine is confirmed by the Russian annals. Nestor tells us the Pechenegs appeared for the first time in Russia, *i.e.*, in the principality of Kief, in the year 915. They made peace with Igor, the Russian chief, and advanced as far as the Danube, and had intercourse with the Greek Empire (*op. cit., ed.* Paris, i., 53).

It is not my present purpose to tell the story of the long and fierce struggle which the Pechenegs fought both with the Russians, and the Greeks of Byzantium. This will form the subject of a memoir elsewhere. My present purpose is purely ethnographical.

As I have said, Constantine tells us that three divisions of the Pechenegs were Kankalis. These three were the Ertem, Tzur and Gyla. They formed the *élite* of the nation, and I must defer the consideration of them to a future letter, when I hope to deal with the Kankalis; at present we will limit ourselves to the remaining five divisions who constituted the Pechenegs proper.

The meaning of the word Pecheneg is not well ascertained. The majority of Turkish tribes are called after some noted leader, who has led them to victory, or been otherwise famous. Such is the origin of the names Osmanli, Seljuki, Nogay, Uzbeg, &c. Kipchak is a well-known personal name among the Turks, and it would seem that the Kipchaks were named in the same fashion.

It is very probable that the Pechenegs were named in the same way. We, at all events, meet with the name as a personal name. Thus we are told that when Yermak the Cossack attacked the Siberians on the Tawda, and they had assembled in the neighbourhood of Pechenka, a prince called Pecheneg was among the slain. Sviatoslaf, the Russian hero, was killed by the Pechenegs in 972, and we are told he was beheaded in Pechenka curia: so that we have two Pechenkas, or lands of the Pechenegs, one on the Dnieper and the other in Siberia. The name Pecheneg occurs for the last time in the Russian annals, so far as I can make out, in the year 1152. But in 1162, and in that section of Nestor written by the Fourth Continuator, we find a new name, namely, the Black Klobuks, or Black Caps; and we read that the Poloutzi having made a raid as far as Kief, and destroyed a great number of kibitkas—*i.e.*, Tartar arabas or carts—killed Voiborn. Upon this the Black Klobuks went in pursuit, overtook them near the banks of the River Ross, killed a good many of them, and recovered the captured booty (Nestor, ii., 98). They are also mentioned in 1174, 1187, 1190, 1192 and 1200 (*Golden Horde*, 454-456).

We again meet with the name at the time of the great Mongol invasion of Europe under Batu Khan. Raschid tells us that in the autumn of 1239, Batu, with the other princes, marched against the Russians and the Black Caps (D'Ohsson, ii., 627). Now the name Black Caps or Black Bonnets is a specific tribal name among the Turks. The Turkish equivalent for Black Caps being Karakalpaks.

The Karakalpaks still form a separate aggregation of Turkish clans, whose importance is now much reduced, but who have an old and distinguished history. They formerly, and before the destruction of Bolghari, lived in its neighbourhood and along the banks of the Volga, from Kazan to Astrakhan. (Von Hammer, *Golden Horde*, 26 and 363). And it is not improbable that the chief called *Bachiman*, who ruled on the Volga at the time of Batu's invasion, was the ruler of these eastern Pechenegs.

It was Timur's cruel campaign in the Kipchak, in 1397, which apparently caused their migration to the south-east (*id.*, 364). They then migrated to the shores of the Sea of Aral, and the banks of the Syr Daria, and the Kuwan Daria, where they had fixed quarters in winter and nomadised in summer (*Asia Polyglotta*, 222). The Karakalpaks were still settled about the Lower Jaxartes in 1730, and in 1732 they followed the example of the Little Horde of the Kirghiz Kazaks in submitting to Russia. The Kirghizes oppressed the Karakalpaks very persistently, and at length drove them away. One section found shelter in the Khanate of Khiva and another in that of Bokharah (Michell's *Russians in en tral Asia*, 311-313).

The Karakalpaks in the government of Khiva are described by Vambery (*Sketches of Central Asia*, 293-295). These Karakalpaks of the Syr and Amu Daria are known as the Lower Karakalpaks; and when they fled to the south-eastward, another body escaped more to the north, and took refuge with the Kalmuks (Michell, 312).

As I have said, before their dispersal by Timur they lived on the borders of the Bashkirs, and the Bulgarians of the Volga, and were known also by the name of Manguts, *i.e.*, flat-noses; a *sobriquet* they well deserve, judging from a Kirghiz proverb quoted by Vambery, that "the Karakalpak has a flat face, and is himself totally flat." One of the principal features of the Karakalpaks, distinguishing them from the other Turkish tribes, is their possession of considerable quantity of hair on their faces. This I can testify, from having seen the beautiful photographs of them, exhibited by the Government of Tashkend at the recent Oriental Congress at St. Petersburgh. Bakui says of the Bachenaks that they had long beards and large moustaches: he adds, their food consisted chiefly of millet (D'Ohsson, *Abul Cassim*, 117 and 118). Vambery says that a favourite food of the Karakalpaks is Kazan djappay, *i.e.*, meal baked in a pan with fat.

For these reasons I deem it exceedingly probable that the Pechenegs proper were the same people as the Manguts or Karakalpaks of our day.

The western division which settled on the Dnieper, and which was composed of Kankalis and Pechenegs proper, became, doubtless, to some extent mixed with other tribes during the domination of the Mongols, but they formed, I have no doubt, the main portion of the Nogay hordes which until recently depastured the steppe-lands of Southern Russia. In the list of the tribes of Kipchak given by Novairi in 1325, and which, doubtless, consisted in the main of Nogays, we find one named Kara Burkli, *i.e.*, Black Caps, equivalent to Karakalpaks. One of the western tribes of the Nogays was called Budzuck, doubtless a form of Pecheneg. Another is called Mangut, while two others are named Kanli or Kankli.

Lastly, Strahlenberg (282) mentions that "east of the Jaik, and close to the country of the Karakalpaks, there are still places called Talmasata and Curcutata, which we may compare with Talmat and Tzur, given by Constantine Porphyrogenitus as the names of two of the eight sections of the Pechenegs."

My conclusion is that the Pechenegs were originally Manguts or Karakalpaks, and that, having been joined by certain tribes of Kankalis, they invaded Europe; and that the Nogays represent the mixed race which thus arose, while the Asiatic Manguts preserve for us the ancient features of the people. I may add that Von Hammer says that Bejnak means the allied or the related (*Golden Horde*, 21).

I remain, yours sincerely,
HENRY H. HOWORTH.

DERBY HOUSE, ECCLES.

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POLAR EXPEDITIONS.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—Perhaps you would kindly make space for a few remarks on the above important subject, in your widely circulating and valuable magazine.

When at the present time so much interest is felt in the results of the late Arctic Expedition, why not examine the aspects of, and inquire into the feasibility of the *route* hitherto generally taken by explorers?

Was it that each succeeding explorer just moved in the groove marked out by his predecessor, and merely satisfied himself by proceeding a degree or so farther north, taking advantage of previously acquired knowledge, and wishing, at least *in extremis*, to have terra-firma within reach? Or if not, why not boldly launch forth, east of Greenland, north by Spitzbergen, &c.? I mean, of course, no disparagement whatsoever to late explorers, to whom all credit is due; but let us now examine the comparative advantages and disadvantages of the route west of Greenland and that east thereof.

Imprimis:—Baffin's Bay is narrow, the *locale* of bergs, from which, on account of that very narrowness, there can hardly, in emergencies, be any escape, whereas by the eastern route there is "ample room and scope enough" to avoid those icebergs, which here are of comparatively rare occurrence.

But my second reason will, I trust, receive attention and be perhaps improved upon by men more conversant with this grave and sublime subject, and that is the *mean annual temperature* west and east of Greenland.

Now, with the exception of the Siberian *tundra* and steppes, there is no known region of so low a temperature as the region of and north of Baffin's Bay. In latitude 60° or less in that region eternal ice exists, and a few degrees farther north will find zero always co-existing; whereas, east of Greenland, the same results are only arrived at even north of 80°. Here then, with an open sea, the isothermal line of temperature favours the explorer, and if there be any use (as there must) in deduction from all ascertained facts, it is only *more than* probable that the coldest tract on earth is not by any means circumscribing the North Pole precisely, but somewhere about the Magnetic Pole, or in the direction of the Siberian tundra; and unless our maps of isotherms be misleading, the cold experienced by the gallant Captain Sir George Nares and Captain Markham could have been hardly experienced even at the North Pole, by the eastern route.

I trust then that scientific men will direct their future observations in this direction, and that coming explorers will benefit by their researches. Should you, Mr. Editor, give insertion to these few remarks, I may return to the subject, hoping that discussion may elicit some beneficial results, and that general knowledge and navigation will receive an impetus, leading future explorers to navigate in a direction where I feel convinced success is only (if at all) to be accomplished.

I remain, dear Sir,
Your constant reader,
ROBERT T. LITTON.

KILMAGANNY GLEBLE, CO. KILKENNY,
20th January, 1877.

Proceedings of Geographical Societies.

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ROYAL GEOGRAPHICAL SOCIETY.

Meeting of 8th January, 1877.

ON the minutes of the previous meeting (December 12th) being read by the Secretary,

Sir MORDAUNT WELLS complained of the arrangements made at the last meeting in St. James's Hall as regarded the comfort and convenience of Fellows, and the manner in which the patronage tickets, to the number, as he heard, of 500, had been distributed.

The PRESIDENT ruled that the speaker was out of order, and justified the action of the Council by saying that, as 6000 persons were entitled to admission it was physically impossible for half of them to be accommodated.

Mr. ROBERT MICHELL then read his paper on

"THE RUSSIAN EXPEDITION TO THE ALAI AND PAMIR IN 1876."

He commenced by giving some particulars respecting the origin of the Kara Kirghiz; he then went on to notice briefly the various journeys across the Pamir from the time of the earliest travellers, and pointed out that the meridional range discovered answered closely to a section of Ptolemy's Imäus.

The Russian Expedition was undertaken to reduce the Kara Kirghiz to obedience, this population having, since the annexation of Kokand, successfully defied the efforts of the Russians to secure safe passage for their caravans. With this object General Kaufmann ordered Major-General Skobelef to organise a detachment, which, under his command, should advance to the Alai, and march into the very heart of the summer pastures of the Kirghiz, and so coerce these nomads. The expedition was furnished with a military topographical party of eight, besides three persons, Messrs. Bonsdorf and Oshonin, and Captain Kostenko, who were charged with the astronomical and barometrical labours, the natural history department, and the geography and statistics respectively. The scientific members of the expedition left Tulsha on the 31st of July (N.S.), overtaking the military force at Kizyl-Kurgan. The road led for the most part along high mountain-ledges by the Gulsha River, over which bridges of frail construction occasioned no small trepidation to the troops. At the end of the second march the detachment emerged from the Gulsha defile, and having crossed the Kizyl-Kurt range, ascended the picturesque Archat defile to the pass over the Archat Mountains, which are exceedingly steep. The absolute height of the pass was 10,300 feet. Further west is the Taldyk Pass, which is considerably less steep, and may therefore be more easily adapted for a carriage-road. From the top of the pass a magnificent panorama opens to the view. In the foreground is the Alai plateau, beyond it rises the Trans-Alai mountain-range. The Kizyl-Su flows near the foot of the descent from the Archat Pass, and winds in a bed about a verst (two-thirds of a mile) wide, and divided into several arms. At that time of the year the water is about 28 inches deep, is potable, and of a red colour from the clay in its bed. After fording the river the detachment proceeded across the Alai Steppe, which was thickly covered with feather-grass and *kipetz* (which latter is very nourishing for horses), and thence to the base of the Trans-Alai range, where they remained some few days. From this position to the summit of the Kizyl-Yart pass was 18 miles. A scattering of gigantic horns of the *Ovis Poli* was the only evidence of life along this line of country. After crossing a second range of no great altitude, the division came in sight of

a large lake, the Kara-Kul, lying within 43 miles of the base of the Trans-Alai Mountains. The water of the lake was azure, and an island was observable in the middle of it. The surface appeared to be slightly frozen. According to the guides, Kashghar was distant only a leisurely ride of six days.

Captain Kostenko describes the ride up the defile to the Kizyl-Yart pass as one of great difficulty, owing to the broken nature of the ground. He is, however, of opinion that the whole road, from the mouth of the defile to the top of the pass (11,700 feet), might be made available for wheeled carriages by removing the stones which block up the bed of the river and cover the mountain slopes. The Kara-Kul Lake is encircled by mountains, mostly snow-capped. Captain Kostenko visited it on the 3rd (15th) August, and found that a considerable portion of the lake is occupied by islands and necks of land having the appearance of a high longitudinal ridge. The largest island adjoins the northern shore, and is 8 versts long by 4 wide. It is sterile and quite unfit for habitation by man, but traces of men and beasts were found, and a great quantity of skeletons and horns of the *Ovis Poli* lay scattered about. Captain Kostenko ascended to the highest elevation of the island, and from that point of view he appeared to be in the centre of a gigantic crater filled with water. During the ensuing days he and Captain Lebedef made a survey of the lake on three sides. It consists of two sheets of water east and west, connected by a strait in the neck of land. The length of the lake is 22 versts from north to south, and the breadth along a line passing through the strait is 17 versts from east to west. It has not a single outlet, but, on the other hand, receives several mountain streams, all of which are fordable. On the western side the spurs of the mountains rise from the water's edge, and project in the shape of capes. The water is exceedingly cool and clear, but bitter to the taste. There are fish in it, and plenty of water-fowl frequent its surface and margin. The flat beach along the courses of the streams is covered with a thin but nourishing grass, which affords sufficient, if not abundant, food for beasts. The natives state that rain but rarely falls, and that once a week the level of the lake rises; this last peculiar phenomenon being apparently confirmed by Captain Kostenko's own observation. The expedition remained several days on the shores of the Kara-Kul lake. On the 6th (18th) August, Captain Kostenko started along the eastern margin for Lake Riang-Kul in the Sary-Kol district, towards the Kashghar boundary. A great number of little lakes or lagoons separated from the Kara-Kul by strips of land confirm the belief in its rapid desiccation. After having travelled along the Ala-Baital defile, and followed the course of the Uzbel-Su, the party reached the Uzbel Pass, which separates the basin of the Kara-Kul from that of the Sary-Kol and Tarun-Gol. From its summit (12,500 feet) magnificent views are obtained, westward along the course of Uzbel-Su and Chon-Su, and eastward along the valley of one of the sources of the Kashghar Daria, until a long way ahead the view is barred by a grand mountain-range rising considerably above the snow limit. This is probably the range mentioned by Colonel Yule in his sketch of the geography and history of the sources of the Oxus, and which forms the eastern boundary of the Pamir plateau, dividing it from Eastern Turkistan. Referring to Mr. Hayward, Colonel Yule says that the peaks of this range attain 20,000 to 21,900 feet. It appeared to Captain Kostenko that the range was much higher, and that the peaks rise to about 25,000 or 26,000 feet. The late M. Fedchenko disputed the existence of a meridional range on the east side of the Pamir, saying that Hayward had simply taken the abrupt side of the Pamir for a transverse mountain-range. Captain Kostenko, on the other hand, was impressed with its grandeur. It lies about 53 miles from the Uzbel Pass, and beyond it lies Kashghar, 40 miles further. Humboldt, it may be remembered, laid down the existence of a meridional range, named by him the Bolor Mountains. More recently Severtsoff and Fedchenko, and then English travellers, denied the existence of the above-mentioned mountain-chain, arguing that the Thian-Shan and Himalayan systems combined to form the block which Humboldt took for a meridional range. Shaw and others were of opinion that the connection of the two gigantic mountain systems was by means of a series of ranges mainly extending from east to west. The structure of the Pamir, according to Kostenko, is really quite different. The discovery of this range is an important acquisition to geographical science, and he considers it would be proper to give it the name of Constantine, in honour of the august patron of geographical science in Russia.

Through lack of provisions, Captain Kostenko was unable to push on to the Sary-Kol and compelled to return by the Uzbel Pass and the little Chon-Su defile. On emerging from thence, one comes upon a point where three roads converge—one to Badakhshan, one to Kokand (over the Kizyl-Yart), and the other to Kashghar (over the Uzbel Pass). The main force of the Alai column was rejoined at Archa-bulak, at the southern base of the Alai range. The whole distance marched by Captain Kostenko's force, from the mouth of the Kizyl-Yart defile to the Uzbel Pass, was 90 miles.

Prince Witgenstein, who was attached to the expedition, had previously passed up the Chon-Su river, returning by way of the Tuyuk-Su Pass, and crossing the snowy range. It was ascertained on inquiry that the Aksu-Murghab flows 53 miles in a south-easterly direction on the other side of the pass, after which that river emerges on a wide elevated plateau which is traversed by a large and wide river called the Kara-Daria, and by a road leading to Kashghar and to Afghanistan.

Captain Kostenko makes the following general observations on the portion of the Pamir visited:—

The Trans-Alai Mountains, having the appearance of an immense white-crested wall, limit the Pamir on the north. Beyond this range extends a high land gradually rising towards the centre This high land is intersected in all directions by mountain-ranges, some of which are snow-capped and others not, but, generally speaking, having only a small elevation above the adjoining valleys and plain surfaces. The plains and valleys, or hollows, do not extend in any one particular direction, and in most cases are not wide (say two or three versts); they frequently turn off into side openings. The valleys, as well as the mountain-slopes, are bare. They have neither trees, brushwood, nor grass. Small strips or patches of grass occur only along the courses of the mountain-streams, and this grass is in some places thick and succulent, affording food for the cattle of the nomads.

The mountains being of a soft formation, all the passes are comparatively low and easy. The streams, pouring down from no great altitudes, offer no impediment. Generally speaking, the roads on the Pamir are very easy in all parts. The ground is either sandy and stony, argillaceous, sandy-salinous, or simply salinous. In those parts where the salines have got dry, the ground is covered with a thick layer of magnesium, which glistens like snow. Occasionally, one falls in with moist places covered with a thick but not high grass, and wheresoever the ground is soft enough to retain impressions one may observe the tracks of wild beasts. Thus the tracks of wild goats, horses, wolves, and deer were seen. There used to be here an innumerable quantity of arkharas (*Ovis Poli*), but they seem to have been all destroyed by the disease among them in 1869, as may be concluded from the abundance of immense heavy horns scattered over the whole line of country which we traversed. Neither a single live specimen nor the tracks of one were seen. The horns were always found with the skull, and no one seems to have ever seen the rest of the carcass.

There are neither bears, nor tigers, nor wild yaks in the portion of the Pamir over which the Russians passed.* The birds noticed were eagles, kites, red-beaked crows, and numerous small species.

Notwithstanding the severity of the climate of the Pamir, the country is inhabited by nomads, who come in the summer from Kashghar, Shugnan, Karateghin and other places. They occupy themselves with cattle-breeding. The severity of the climate is the greatest discomfort to man on the Pamir. In the summer the days are extremely hot and the nights are cold; the Chon-Su rivulet freezing with a coating of ice a quarter of an inch thick. The rareness of the atmosphere is also a source of great discomfort on the Pamir, even in summer; but Captain Kostenko considers that the stories of its injurious effects are somewhat exaggerated.

On the 16th (28th August) a portion of the Alai expeditionary force from Archa-bulak was moved along the Kizyl-Su to Darant-Kurgan, a distance of 43 miles. Captain Kostenko accompanied a half company of Prince Witgenstein's, who ascended the course of the Tuz-Altyn Daria. The head-water of the river is remarkable as giving rise to another stream flowing in a diametrically opposite direction. The Ters-Agar streamlet falling from a snow-capped summit in the left or western range, divides into two at the base of the mountain, one flowing northwards and forming the above-mentioned Tuz-Altyn Daria, and the other running due south, preserving the name of Ters-Agar, and reaching the large Muk-Su river. The mountains closing it on the south are covered with snow over two-thirds of their height, and some of the peaks attain an altitude of at least 25,000 feet.

The Muk-Su is a large body of water, and is not fordable. The head of the river may be said to be at the spot where Kostenko came down into the valley, being formed by the confluence of several streams, viz., the Sel-Sai,† the largest of them, which pierces through the southern range (gou), and flows in a north-western direction; the Koündy, which flows west; the Suok-Sai, which falls into the Muk-Su, bearing a course towards the south-west; and finally, the above-mentioned Ters-Agar, which comes in from the north. The valley of the Muk-Su extends from east to west, with a slight southing (5°).

This valley preserves the same character for 40 versts (27 miles) as far as the Hoja-t-ăb "tuga," after which it contracts, and the road passes over the mountains, where the path, according to the natives, is not practicable to horsemen, on account of the boulders. The river passes into Karateghin, where it joins the Kyzil-Su, and combines in forming the Surkhab affluent of the Oxus.

Captain Kostenko is the first European who has obtained a sight of the head-waters of the Muk-Su river. The valleys of the Kyzil-Su and Muk-Su are totally different in character. The first-named river is much longer than the second, and right up to the Karateghin territories it flows through a valley widening out 20 versts (13½ miles), and carpeted with grass over its whole extent. This river is not deep, and is fordable at all points as far as Darant-Kurgan, *i.e.*, throughout a length of 100 versts (67 miles). The water is red in colour, from the red clay in which it runs. The Muk-Su, on the other hand, has not so great a length, but is a large body of water. It is difficult to say which of the two rivers is to be taken as being the main head-water of the Surkhab. It is perhaps more correct to say that the Kizyl-Su and the Muk-Su equally combine within the Karateghin territories to form the great river which flows to the Oxus.

After an interview between the envoy of Karateghin and General Skobelef, the latter marched to Great Karamuk 19 miles along the Kizyl-Su. The meadows in this locality are very rich and attract numbers of Kirghiz. The troops afterwards ascended the valley of the Kok-Su river towards Kokand. The Kara-Kazyk, one of the principal passes over the Alai, is at the distance of 20 miles along this defile. This summit of the pass is 12,600 feet high, the crest is very narrow, and bears some resemblance to a comb (*tarak*). Both the ascent and descent are very difficult. Shah-a-Mardan is about 30 miles from the pass; it is well-known for the beauty of its situation, nestling as it does at the opening of several defiles, and, as it is not confined by mountains, the view is charming and varied. The Saint buried here (who is locally supposed to be Ali the Fourth, Caliph of the Mussulmans) is the patron saint of the country. The next station was Vadil, in the centre of the Chemion district, one of the new administrative subdivisions of the Ferghâna Valley since its annexation to the Russian Empire.

Colonel H. YULE said that the Russians seemed to attach a great deal of importance to the discovery of the so-called meridional range, but Lieutenant Hayward had described the same mountains seven or eight years ago, and, after him, Captain Trotter stated that the eastern portion of the Pamir was bordered by a very high, snowy chain of mountains, running from north to south. The Russian Expedition had attached a fictitious importance to this, recalling the ideas of Humboldt, and going back to the views of Ptolemy, and they proposed to call the range after the great patron of geographical science in Russia, the Constantine Range; but if it had to be called after the great pillar of geographical science at the time of its discovery, it should have the name of Roderick or Henry. It was said in the paper that Ptolemy described the Imaüs as a meridional range from north to south, and as distinct from the mountains to the south and north of it; but the fact was that Ptolemy's authority, so far as it went, was just the other way. Ptolemy called all the mountainous region by the same name—"Imaüs"—which was merely a Græcising of the word Himalaya, or whatever was the form of that word in his day. The real, prominent distinction between these two parts of Central Asia was not physical, but historical. The Himalayas proper had been in all history the great impassable barrier between Central Asia and India, while the Pamir had been the great road between Western and Eastern Asia—between Asia inhabited by Persian and Turkish races, and Asia inhabited by the races from time to time subject to the Chinese Empire. In fact the Pamir was a sort of sea-wall, against which the ocean of Chinese domination had beaten again and again in the course of the last three thousand years. What Ptolemy said about it was probably the most interesting part in the dry bones of his geographical tables. In the introduction to his geography, when discussing the length of the habitable earth, not having many data at hand, he quoted the account of the journey of a certain Macedonian merchant, Maës Titianus, who went to China for silk. Mr. Michell alluded to this, and spoke of the approach to Bactria (the modern Balkh) having been from the north. That was an old idea, but an entirely mistaken one. Of late years a perfect key had been discovered to this journey of Ptolemy's merchant, for he mentioned that after leaving Bactria they travelled somewhat to the north, and entered the hill-country of the Comedæ. It was now known from the Chinese travellers, who had been translated by the great French scholars within the last twenty or thirty years, where the exact position of the Comedæ was. The district was described as having Shignan to the south, Khotan to the east, and the Oxus along the south-west. The position of London on the Thames could not be described more exactly, and that fixed the position of the Comedæ in Roshan. From the hill-country of the Comedæ the merchant went somewhat to the south, and then turned up a great gorge which led him to the "stone tower," traces of which would probably be found when the hill-country of Shignan was better known. From thence they crossed the Imaüs into the

* Colonel Yule asserts the contrary.

† "Sai," probably a corruption of "Su," water.

empire of China. So far, then, as Ptolemy's authority bore on the physical history of this isthmus of mountains, it was in favour of its identification with the Himalaya; though his authority in that respect was not worth a farthing. The Russians, too, seemed to desire to return to the old name of Bolor. Their proof of the name seemed to be something like Jack Cade's proof of his ancestry. His father was a bricklayer, and his friend said "Yes, and he built the chimney of my father's house, and the very bricks are there to this day to testify thereof." The name "Bolor" arose entirely out of a mistake, and he hoped it would not be used again, because it had been found that there was a range of mountains running from north to south. One thing had struck him in connection with the name of the Muk-Su, which the Russians had described as a tributary of the Surkhab, a branch of the Oxus, because it curiously illustrated how different was the fate of truth and falsehood. In that fictitious narrative, which caused so much discussion some years ago, this region was crossed and recrossed by an imaginary traveller who gave many names. Since then new names had been learnt and old ones recovered, but none of the names mentioned by the German traveller had been recovered. The name "Muk," however, occurred in the *History of the Mogul Emperors*, where a rebellious brother was sent into banishment, and made Nawab, or whatever it was, of Karateghin and Muk. Probably that name of Muk had hardly ever been heard since the sixteenth century until within the last two or three years. Thus the real name turned up in the real country, while the false names were heard of no more.

Sir H. RAWLINSON said he had very little to add to what Colonel Yule had said. There were a few points upon which he did not entirely agree with Colonel Yule, but generally he was in perfect accord with him upon this subject. All his recent inquiries had led him very much to the idea that the real route of Ptolemy's merchant was up the Surkhab. All the late Russian surveys had been in the north-east portion of the Pamir, about one-third of which they had crossed, and their approach in that direction had not unnaturally excited a good deal of interest, and perhaps apprehension, in India; but he thought the result of the survey had been to show that that line of country was quite impassable by an army; but it was an easy country for the Kirghiz to pass over. He felt bound to protest against the idea that the Kirghiz were of Aryan derivation. If ever there was a pure Turanian race it was the Kirghiz; and the notion of their being Aryans was one of Klaproth's paradoxes, like his fables of the Irrawaddy and the great river of Tibet, These Kirghiz now possessed the whole of the Pamir, and found it very easy to travel over it in all directions, but it could not be crossed by an army. It contained no supplies except herbage in summer. If ever the Russians approached the Valley of the Oxus, which was a very rich and attractive country, it would be down the line of the Surkhab or the great Waksh River. Perhaps he would rather surprise Colonel Yule when he stated that he believed that was Ptolemy's old route, and that the famous stone tower would be found somewhere in Karateghin; in fact it might be the very limit of the Muhammadan world, the Rasht of the geographers. Washgurd, which was the great capital of this region, was, he believed, at Faizabad, from whence there was a river—the Ilik—which was the route from Washgurd towards Rasht, which would probably be found at Garm. In Timur's campaigns, when they wished to pass from Hissar to Mogulistan, they invariably went up this river. Karateghin was first mentioned in the wars of Timur, the name being derived from Karateghin, who was the governor of that country, and who died in Affghanistan. The extreme post of the Muhammadans was at Rasht, and the only road from the rich country of Hissar up into the Valleyof the Jaxartes was by the Muk-Su, down the Valley of the Murghab. He believed there was a European still living—Colonel Gardiner—who had actually crossed from the Valley of the Oxus into the Alai. In the biography of that extraordinary man, which was published by Sir Henry Durand in the *Friend of India*, some ten or fifteen years ago, it was distinctly stated that Colonel Gardiner did pass from Badakhshan to the Alai, and he ought to have some information concerning those countries of the greatest value; but his papers were in such a chaotic state that nothing worth geographical discussion had ever yet been recovered from them. No doubt the questions of physical geography which arose in consequence of these Russian discoveries were important, but he quite agreed with Colonel Yule that there was nothing very new about them. The so-called meridional range was, he believed, not meridional, but slanted off to the west. Neither was it a separate range, but merely the series of culminating points of the ranges which transect Pamir, and of which the Alai and Trans-Alai are branches.

Sir DOUGLAS FORSYTH said he exceedingly regretted that Captain Trotter, who was more competent than any other Englishman to speak on the subject before the meeting, was not present, but in a short time he would read a paper upon it. He did not want to say much about Ptolemy; in fact he was rather afraid to touch the subject at all, but Heeren, in his *Researches on Asiatic History*, suggested that between Kashghar and Kokand, over the Terek Pass, and so on to Samarcand, was the great route by which the trade from China passed to the west; and certainly if the traders did not take that route they were very silly, for it was decidedly the easiest.

Sir H. RAWLINSON said the line passed through Balkh.

Sir DOUGLAS FORSYTH replied that it also went to Samarcand.

Colonel YULE; Never.

Sir DOUGLAS FORSYTH was of opinion that it did, and went to Kashghar. The men connected with his mission went from Chatir-Kul across to Wood's Lake, down to Kilapanja, and back to Yarkand. Captain Kostenko saw the meridional range for a day or two, considered he had discovered it, and called it after the Grand Duke Constantine; but the English Mission at Kashghar before then saw it day after day for about six months, and did not attempt to give it a name; but they learned the actual names of the different peaks. The range was not in so straight a line as it appeared on the map. He described the course which the range took, and said he believed the smaller Kara-Kul was the head of the Yaman-Yar. The Russian travellers spoke of Kara-Kul as having no outlet of any kind, and that matter had given him a great deal of trouble. Everybody he asked about it told him a different story. Some said it had an outlet to the west, others to the east, others that there was an outlet at each end: but nobody ever suggested that it had no outlet at all; and, with all due deference to Mr. Michell's authority, he did not think it had yet been proved that there was no outlet, for Capt. Kostenko had not actually been round it. In the Pangong Lake, near Leh, a traveller might keep close to the edge, and go almost entirely round the lake, without finding an outlet, but at the west end, in a gorge about a mile below, the water issued forth with as great force as if it came directly out of the lake itself, there being an underground passage. He joined with Colonel Yule in thinking that the word "Bolor" ought to be absolutely abolished, because it was unknown to the present inhabitants of those parts. Some centuries ago, however, a country called Bolor was so accurately described, that the boundaries might almost be walked blindfold.

General R. STRACHEY hoped that all travellers who had their accounts translated into another language would have such an excellent interpreter as Mr. Michell. He entirely agreed with Colonel Yule regarding the general view that should be taken of the mountain-ridges that had been discussed. When a mountain-

range was spoken of, it should, first of all, be clearly understood what was meant by a mountain-range. The mountains to which Humboldt gave the name of Bolor were, in reality, nothing more than that portion of the elevated mass of land which formed the barrier in Turkistan between the head-waters of the rivers trending west and those trending east. No human being could say to which particular portion of the elevation it physically belonged, because no one knew anything about the Thian Shan, and very little was known about the central portion or the northern portion of the Afghan table-land. His own impression was that the mountains which had been referred to in the paper were rather a prolongation of the Tibetan highlands and the Himalaya. Captain Kostenko had referred to the dry haze observed in one of the valleys of a tributary to the Oxus, as something very peculiar; but every one who had been in the Himalaya knew that it was a very common phenomenon there. Along the whole face of the Himalaya during the dry months a wind blew from the heated plains during the day, bringing with it great quantities of dust, and the haze thereby caused on the tops of the glaciers at an elevation of 10,000 or 11,000 feet was nearly as bad as a London fog. The same winds blew with equal violence along the Valley of the Oxus during the hot months, and he had no doubt a haze was produced there in the same way as in the Himalayas.

Sir GEORGE CAMPBELL said he had always understood that the Valley of the Oxus was by no means a rich country, and he was therefore surprised to hear Sir Henry Rawlinson speak of it as a region which the Russians would covet.

Sir H. RAWLINSON replied that he did not refer to the immediate banks of the River Oxus, but to the plains on each side watered by the streams descending from the mountains. All the streams running from the Hindu Kush were consumed by irrigation canals in a cultivated region before reaching the Oxus. The district of Kunduz was notoriously rich, as was also Kulm, while Balkh was one of the most fertile districts in Asia, only surpassed by Merv. On the eastern side the Valley of Kulah was exceedingly fertile. Where there were large mountain-streams running down into an alluvial valley, under a tropical sun it was an absolute law of nature that there should be fertility. Sir George Campbell was quite right in saying that the immediate banks of the Oxus were comparatively uncultivated, because the water was all consumed before reaching that river. At the same time the general character of the valley of the Oxus was certainly one favourable to cultivation.

The PRESIDENT, in conclusion, observed that the paper and the discussion to which it had led, proved that with regard to this part of Asia less was positively and scientifically known than almost any other portion of the world. Geographers must, therefore, be very grateful for every modicum of real knowledge that could be obtained. Mere general observation was of very little value when such a confused chaos of mountains was under consideration. He hoped that now, when, by a new convention with China, the road into Central Asia, Mongolia, and Tibet seemed likely to be opened up, the Government would take care that any political mission that was sent in these little-known regions would be accompanied by scientific explorers, who could really obtain trustworthy scientific results, and he thought the Society would be perfectly justified in pressing that consideration as one of great importance.

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VIENNA GEOGRAPHICAL SOCIETY.

October 24th, 1876.—Professor VON HOCHSTETTER in the chair. The following were elected honorary members:—The King of the Belgians, Baron de Lambermont, Sir Rutherford Alcock, Sir Bartle Frere, H. M. Stanley, Captain Lovett Cameron, and Captain von Schleinitz. The Society, since its last meeting in May, has lost nine members by death, amongst whom are Dr. Ehrenberg, of Berlin, and Dr. P. Forchhammer, of Kiel.

The President announced that the Society had received £100 from its Patron, the Crown Prince Rudolf, to be devoted to the promotion of its objects.

The President then reported on the results of the Geographical Conference, which had taken place at Brussels. The resolutions of the conference were accepted, but the election of an Austrian Committee was deferred until the December meeting.

Dr. JOS. CHAVANNE read a paper on Central Africa and our knowledge of it, in the course of which he dwelt more particularly upon the discoveries and explorations of Livingstone, Stanley, and Cameron.

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November 28th, 1876.—Dr. VON HOCHSTETTER in the chair. The following are elected honorary members: Captain Nares and Captain Stephenson.

Dr. O. LENZ writes from the Gabun, dated September 12th, 1876, that he had returned from his explorations, and was suffering much from fever and rheumatism. He intended to return to Europe at the earliest opportunity.

The President announced that the Council of the Oriental Museum had been communicated with to join them in establishing a National Society for the explora- of Africa, in connection with the International Association founded at Brussels.

Professor C. ZEHDEN then read a paper on Lake Tahoe, in the Sierra Nevada of California, which he had visited in August last. The lake lies at an elevation of 6300 feet above the level of the sea, and is surrounded by snow-clad mountains, 12,000 to 13,000 feet in height, covered with forests up to a height of 10,000 feet. It is 20 miles long and 10 to 15 miles wide. Its greatest depth is 1645 feet, about 2 miles from the western shore; the depth in its centre does not exceed 1000 feet, and towards the east it is shallower still. Only small rivulets or torrents flow into the lake, which discharges its waters through the Truckee River. Its water is transparent, and a piece of white quartz is visible at a depth of 80 feet. The temperature of the water, even in summer, is very low, and never exceeds 59° F. at the surface. At a depth of 6 feet it is only 43° F., and at a still greater depth 41° F. These temperatures explain the unsuitability of the sea for bathing. The great depth of the lake accounts for its not freezing during winter, although the snow around it is piled up to a height of 26 feet. The lake abounds in fish, and about 175,000 to 200,000 pounds of trout are caught annually. Trout weighing 30 to 36 pounds are by no means rare. The surrounding pine forests are being cut down to supply the mines of Virginia City and other places. Virginia City alone consumes a million cubic feet of lumber annually. At Glenbrook, on the western shore of the lake, there are saw-mills. It is proposed now to conduct the waters of Lake Tahoe to San Francisco and other cities in California. This would require the construction of an aqueduct 250 miles in length, and of a tunnel of 12,000 feet. The cost of this work is not to exceed ten million dollars, and its promoters promise themselves a splendid dividend.

Lieutenant VON BECKER, who had accompanied Allen Young in the 'Pandora,' rendered an account of their voyage.

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BERLIN GEOGRAPHICAL SOCIETY.

December 2nd, 1876.—Baron RICHTHOFEN in the chair. Dr. NACHTIGAL communicated the last letters received from German travellers in Africa, and congratulated the African Association upon the successes achieved hitherto, which compensated its members to some extent for the disappointments and losses they had sustained. Dr. POGGE had announced his arrival at Malange, on the beginning of October, and his approaching return to Europe. His journals and collections

are intact, and contain much that is new with reference to a most interesting portion of Africa. Mr. MOHR was at Donde, on October 6th, in perfect health, and fully equipped for the interior. He looked forward to a meeting with Pogge, at Malange, and hoped to be able to profit by that traveller's experience.

Captain VON SCHLEINITZ then continued reading his paper on the scientific work done on board the German frigate 'Gazelle' during a recent voyage round the world.

Dr. COCHINS communicated the results of three and a-half years' scientific travel in Japan.

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HAMBURG GEOGRAPHICAL SOCIETY.

December 7th, 1876.—Captain KOLDEWEY read a paper on the results of the English Arctic Expedition. The objects of this expedition had been strictly scientific, and although its promoters were desirous that an effort should be made to attain as high a latitude as possible, they nevertheless did not lose sight of the importance of scientific research. He thought that these objects had been fully attained, and that the results confirmed the arguments adduced in favour of a route through Smith Sound. A higher latitude would have been attained if the coast of Grant's Land, which was found to trend to the west, had extended in the direction of the Pole. The opinion of Arctic navigators, that a coast-line offered the only basis for extending our knowledge of these regions, had been confirmed. Every attempt to cross the pack-ice in sledges, or to navigate the seas lying within its limits, had failed hitherto. The nature of the ice discovered to the north of Robeson Channel, the tidal wave setting towards the south, as well as the geographical distribution of the musk-ox and of other animals, all proved that the Palæocrystic Sea discovered by Captain Nares communicated with the sea to the east of Greenland, and that the latter could not extend much further towards the Pole. He thought it desirable that the exploration of Northern Greenland should be carried on from Robeson Channel not only, but also from the east coast. He regretted that circumstances should have compelled Captain Nares to return after having passed only one winter in these high latitudes, for a prolonged stay might have enabled him to complete the exploration of Northern Greenland. At the same time the results attained were of the utmost importance, and only those could talk about a failure who looked upon the attainment of the North Pole as the only legitimate object of Arctic expeditions. Immediately on his return from East Greenland he had pointed out the absurdity of merely striving to reach the Pole, instead of systematically extending our geographical and scientific knowledge. Greenland, whether approached from the east or through Smith Smith, appeared to him to afford the best basis for future researches, and he trusted that the German flag would be worthily represented in them.

January 4th, 1877.—Dr. KIRCHENPAUER in the chair. Dr. MAX BUCHNER read a paper on New Zealand, the Island of Kandavu (one of the Fiji group), and the Sandwich Islands, which he had visited in 1876. He more especially dwelt on the present condition of the natives of these islands, described the boiling springs of Ohinemutu, in New Zealand, and a visit to the Kilanea, on Hawai.

Dr. NEUMAYER read a paper on explorations in Australia during the last sixteen years.

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PARIS GEOGRAPHICAL SOCIETY.

December, 1876.—Baron de LA RONCIERE LE NOURY in the chair. The President opened the meeting by communicating the results of the conference held at Brussels under the presidency of the King of Belgium. France would be represented on the executive committee by M. de Quatrefages, and they were about to form a national committee, which would include men of mark without reference to political opinions. France would be found to be to the fore in this work of science and humanity.

M. MALTE-BRUN, the President of the Executive Committeee, announced that the Society during the past year had had an increase of 200 members.

M. MAUNOIR, the Secretary, read his annual report on the work done by the Society and on the progress of geography generally. The report on the International Congress of Geography was nearly ready for publication. Amongst works referring to historical geography, he referred to A. Himly's *Histoire de la formation des Etats de l'Europe centrale* and E. Desjardin's *Géographie de la Gaule romaine*. Geographical societies had been established at Madrid, Bucharest, Brussels, and Antwerp. Amongst the engineering works now in progress, the St. Gotthard Tunnel and the draining of the Zuyder Zee were particularly interesting to geographers. The various projects for constructing railways in Central Asia were likewise deserving of attention. M. Maunoir then reviewed the principal geographical explorations. Professor Nordenskiöld had established a new commercial high road between Norway and the mouth of the Yenisei, and his work had been supplemented by the explorations conducted at the instance of the Bremen Society for Polar Exploration. The numerous expeditions of the Russians in Central Asia had considerably enlarged our geographical knowledge, as scientific men were frequently attached to the military or diplomatic missions. The English surveyors starting from India were gradually unveiling to us the mysteries of the Pamir and of Tibet. Kambodia had been explored by Dr. Harmand. Passing over to Australia, M. Maunoir referred to the explorations of E. Giles in Western Australia and to the recent expeditions to New Guinea. In Africa, he said, discoveries were keeping pace with all reasonable expectations. M. Masqueray had made important archæological discoveries in the Aures mountains; the levelling of the Tunisian shotts had been completed by Captain Rondaire, and there was no doubt now that an inland lake could be formed to the south-west of Algeria; M. Largeau had returned from Ghadames, and was about to start, with M. Say, for the mysterious region of Ahaggar, not hitherto visited by any European; and M. Bonnat had ascended the Volta river and visited the commercial city of Salaga. MM. Savorgnan, de Brazza, Marche, and Dr. Ballay were still on the Ogowe, and the friendly terms established by them with the Aduma tribe justified us in looking forward to important discoveries. Amongst the numerous *reconnaissances* made at the instance of the Egyptian staff, that of the Mwutan Nzige, by Signor Gessi, was perhaps the most important. Stanley, too, had much enlarged our knowledge of the regions of the Upper Nile, and Cameron had returned to Europe after crossing the whole of Africa, from east to west. Having referred to the explorations carried on in Chili and Peru by M. Ch. Wiener, M. Maunoir referred to the journey of M. Ed. André, from Truxillo to Guayaquil, which had enriched our geographical knowledge in many respects. In conclusion, the English Arctic Expedition was referred to in terms of eulogy.

M. DESIRE CHARNAY, described a journey across the Pampas of the Argentine Republic into Chili, and M. PAQUIER communicated the result of recent explorations in Kashgharia and the Pamir.

In the evening the members dined at the Grand Hotel, Baron de La Ronciere de Noury presiding.

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EGYPTIAN GEOGRAPHICAL SOCIETY.

January 5th, 1876.—General E. STONE in the chair. The Secretary, M. Marquis de Compiègne, regretted that Gordon Pasha was not able, on account of his

short stay at Cairo, to report personally on his explorations in the regions of the Upper Nile. The financial position of the Society was good, and it would be excellent as soon as the subsidy, so generously granted by the Khedive, was paid to them. Thirty-five members had resigned, and they had to deplore the loss of their associate, Mr. Lucas, who died on his return from Central Africa.

The Secretary then read a paper by M. DOR-BEY, based upon information collected by the late MUNZINGER-PASHA, with reference to the Sudan. There are few mountain-chains in the Sudan, but granite ridges divide that region into well-defined districts, usually named after the rivers which flow through them. As a rule the country is fertile, with extensive pasture lands and a luxuriant vegetation. The watercourses as a rule are mere torrents, almost dry during summer. There are few great centres of population, and all the large towns are on the banks of the two Niles. Gold and copper are found, but the wealth of the country depends upon agriculture and the breeding of cattle. The population, consisting of Arabs and Negroes, may be estimated at five millions, of whom about a fourth are whites. Arabic is the dominant language, and is spoken with great purity. Tigre and Bedaiwa are also spoken extensively, and there are numerous dialects, including that spoken by the Barabras. The inhabitants are not distinguished by any striking features, and the history of the country is obscure. The population may be divided into two great classes, the tillers of the soil, who live in huts, and the nomads. The Arab peasants build themselves houses of stone or bricks. The Muhammadan religion is that of the great majority, but it is mixed with numerous superstitions. Agriculture is carried on in a very primitive fashion. Durra, sesam, cotton, &c., are cultivated: wheat only grows as far as Berber and in Asaba. Industry is very much developed, and only articles of luxury need be imported. Stuffs, sword-blades, and leather of a very superior quality are manufactured, and all along the rivers barges are built in large numbers. The principal exports consist of gums, ivory, skins, &c. There is a considerable transit trade with Dar-Fur and Abyssinia. The Egyptian Sudan is divided into seven provinces or Mudirichs, placed under a Governor-General residing at Khartum. The revenue amounts to £340,000, and is derived mostly from indirect taxes.

Colonel MASON read a paper descriptive of Dar-Fur. The country is inhabited by Negroes and, in the north, by Arabs, who are famous as camel-breeders, hunt ostriches and gazelles, and steal the cattle of their neighbours. Agriculture is at a low ebb, but industry has made considerable progress, the woollen and cotton stuffs sufficing for the wants of the population. The manufacture of metals, more especially, is deserving praise.

M. ABBATE-BEY hoped that the collection of minerals and vegetables made by officers of the staff would be exhibited, and General STONE promised that samples should be furnished to the Society.

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ITALIAN GEOGRAPHICAL SOCIETY.

December 4th, 1876.—Commendatore CORRENTI in the chair. Amongst those present were H.R.H. Prince Humbert, several ministers of state and members of parliament. The President furnished the latest information which had been received from the Marchese Antinori, then dwelling in Africa; he drew the attention of the members to the Brussels Conference, and announced that Prince Humbert had consented to place himself at the head of an Italian National Committee.

Signor ADAMOLI then read a paper on his travels in Morocco, which was listened to with rapt attention. In comparing the coast towns, with their European residents, and the towns in the interior of the country, he pointed out the superiority of the physical and moral condition of the inhabitants of the latter. Morocco held out many inducements to explorers not only, but also to merchants. He expressed a hope that Italians would establish themselves there, in order that they might share in the profits to be derived from the Sudan trade, which France vainly sought to attach to Algeria. He contrasted the Mussulmans of Morocco with those of the extreme East. The latter were undoubtedly most advanced in civilisation. There existed, no doubt, many points of contact between the two, but these, in his opinion, did not constitute solidarity in politics. The Moors, he felt certain, would never render effectual assistance to the Turks, and if the prophecy of a saint of Safi could be relied upon, Mussulman rule would cease to exist in the thirteenth century of the Hegira. In conclusion, Signor Adamoli pointed out the best means for penetrating into the interior of the country.

POSTSCRIPT.

PROPOSED AMERICAN ARCTIC EXPEDITION.

AFTER going to press, we received, through the courtesy of Dr. Petermann, the following Bill, which was brought into the House of Representatives of the United States on January 8th, 1877:

Read twice, referred to the Committee on Naval Affairs, and ordered to be printed.

Mr. Hunter, on leave, introduced the following bill:

A BILL

To authorise and equip an expedition to the Arctic Seas.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the President of the United States be authorised to organise and send out one or more expeditions toward the North Pole, and to establish a temporary colony, for purposes of exploration, at some point north of the eighty-first degree of north latitude, on or near the shore of Lady Franklin Bay; to detail such officers or other persons of the public service to take part in the same as may be necessary, and to use any public vessel that may be suitable for the purpose; the scientific operations of the expedition to be prosecuted in accordance with the advice of the National Academy of Science; and that the sum of fifty thousand dollars, or such part thereof as may be necessary, be hereby appropriated out of any moneys in the Treasury not otherwise appropriated, to be expended under the direction of the President: Provided, that no part of the sum so appropriated shall be carried to the surplus fund, or covered into the Treasury until the purpose of the appropriation shall have been completed, but may be applied to expenses of said expedition incurred during any subsequent year that said expedition may be engaged in its duties.

NOTICE.

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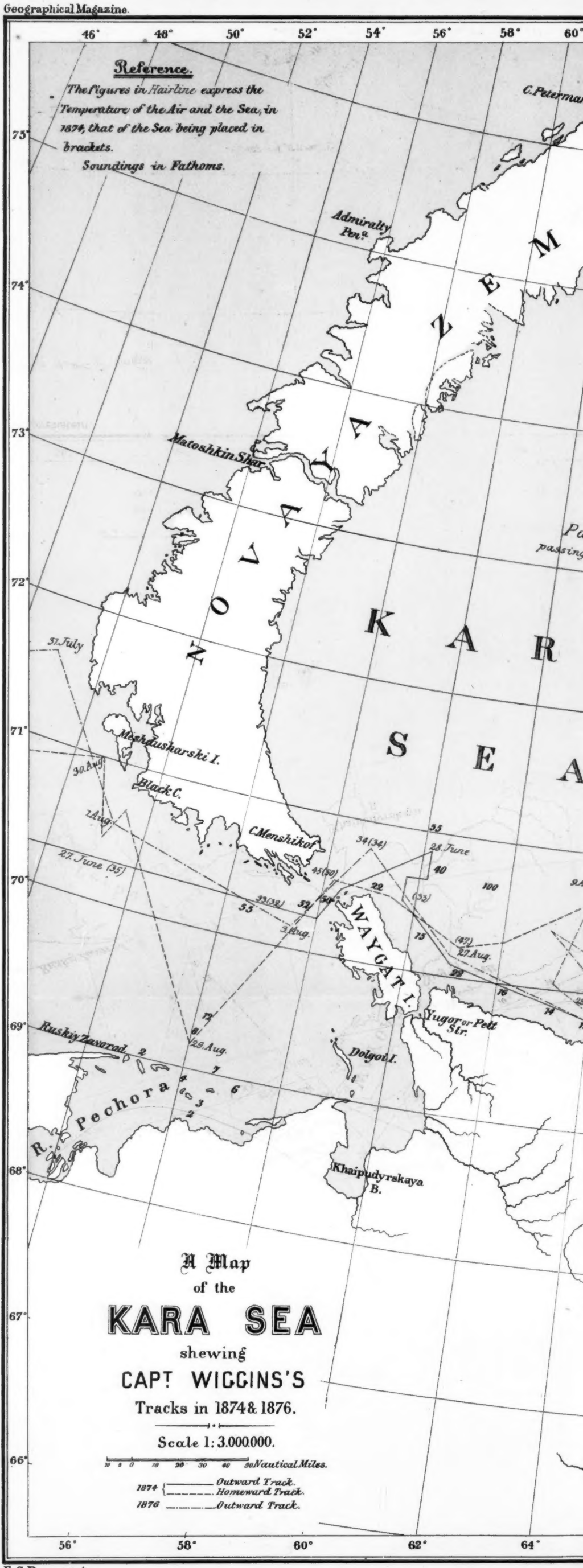

A Map of the KARA SEA shewing CAPT WIGGINS'S Tracks in 1874 & 1876.

Scale 1: 3.000.000.

10 5 0 10 20 30 40 50 Nautical Miles.

1874 — Outward Track.
1874 - - - - Homeward Track.
1876 — · — · — Outward Track.

E. G. Ravenstein.

60° 62° 64° 66° 68° 70° 72° 74° 76° 78° 80

C. Mauritius
C. Ice Cape
Barents' Ice Haven
Open Water
8 Aug.
Open Water
44 (35)
30 (35)
22 Aug.
37
30
20
18
17
Pack Ice
sing away to the North
4 Aug.
11 Sept.
2 Sept.
WHITE I.
2 Sept.
C. Matte Sale
5-7 Aug.
8 Sept.
Low Sand I.
C. Tara Sol
7 Sept.
C. Skuratova
37 (36)
(36)
(36)
(41)
26 Aug.
45 (41)
Var. 24° 15' E.
PENA.
YALMAL OR SAMOYED PENINSULA
GULF OF OB
Gyda B.
2 Sept.
C. Kharvsovai
9 Aug.
8 Aug.
C. Ven-Gan
45 (35)
Var. 23° 30' E.
22 July
28 July
28 Aug.
Nyaba R.
Mutnoi R.
5-7 Aug.
Lütke I.
Kara B.
24 Aug.
BAIDARATA G.
(Muddy G.)
Yurubei
10 Aug.
29 Aug.
24 Aug.
11. 13. Aug.
30. July
Kara R.
Baidaratа R.
Shchuchiya R.
Obdorsk
R. OB

66° Long. 68° East 70° of 72° Greenw. 74°

60° 62° 64° 66° 68° 70° 72° 74° 76° 78° 80° 82° 84° 86° 88° 90° 92° 94° 96°

75° 74° 73° 72° 71° 70° 69° 68° 67° 66°

C. Mauritius

C. Ice Cape

Petermann

Barents' Ice Haven

M L I A

8 Aug. Open Water

Open Water

44 (35)

22 Aug.

30 (35)

37

30

20

18 17

Pack Ice
passing away to the North

37 (36)

(36)

(36)

(41)

26 Aug.

45 (41)

WHITE I.

2 Sept.

4 Aug.

3 Sept.

5-7 Aug.

8 Sept.

Low Sand I.

C. Tara Sol

7 Sept.

40 (35)

C. Skuratova

Var. 24° 15' E.

R A

A

1 Sept.

C. Kharovovai

9 Aug.

8 Aug.

C. Vên-Gan

45 (35)

Var. 23° 30' E.

22 July

16 Aug.

6 fm Sun

(32½)

29 July

22 Aug.

57 fm Sun (35)

Mutnoi R.

5 Aug.

Lütke I.

Kara B.

14 Aug.

BAIDARATA G.
(Muddy G.)

Yurubei R.

10 Aug.

29 Aug.

24 Aug.

11 13 Aug.

30 July

Kara R.

Baidarata R.

Shchuchiya R.

Obdorsk

SAMOYED PEN.

YALMAL OR S

OB

THE

GULF OF

9 Sept.

C. Matte Sale

NorthEast I.

Dickson H.

5-7 Aug.

10 Sept.

11-14 Sept.

Yefremof Kamen

Sibiriakof I.

G. of the Yenisei

Krestovskoye

Sopochnaya Kurga

15 Sept.

Severevo

23 Sept.

Korepovskoye

Brekhovskyi S.

27 Sept.

Muksuninsky

Tolstonasovskoye

Krestovoye

Dudinskoye

6-11 Oct.

Pyasina R.

Gyda B.

TAZ B.

Taz

R. Yenisei

Khatanskoye

17 Oct. 1876.

R. OB

66° Long. 68° East 70° of 72° Greenw. 74° 76° 78° 80° 82° 84° 86°